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## Identifying individual patients' socio-economic position : a basis for vertical equity approaches in primary health care

### Thesis

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**Title: Identifying Individual Patients' Socio Economic Position: A  
Basis for Vertical Equity Approaches in Primary Health Care**

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**Submission: PhD**

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# Abstract

This thesis develops an original approach to identify the socio economic position of individual patients at GP practices.

In diverse and densely populated inner city areas, there is reason to expect that an individually based measure of socio-economic position of individuals may be a useful tool to support effective use of resources in primary care. An innovative method of classifying individual patients' socio economic positions when registering at a GP practice was developed for this purpose. It is argued that this method could be used as a basis for a vertical equity approach to healthcare.

Logistic regression techniques and measures of sensitivity and specificity are used in an original method designed to identify patients to two socioeconomic benchmarks. Criteria are provided for a framework in which decisions can be made to target patients.

The thesis adopts a critical perspective on current thinking around equity in healthcare. Interviews establish that NHS professionals agree that a vertical equity approach would be an effective means to address health inequities. However, they also see significant barriers to adoption of such an approach.

A complex and sophisticated set of issues emerge from qualitative comments from patients concerning this research method. The comments demonstrate a deep engagement with the NHS. They include views on the determinants of health and the way in which healthcare is organised that relate directly to equity in healthcare.

The findings are contextualised in the light of recent government policy proposals and challenge the direction of that policy as being ineffective in addressing health inequities. They also highlight possible future tensions between NHS professionals and patients.



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It would not have been possible to write this thesis without the help of certain people

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# Chapter 1 Introduction

## 1.1 The problem

This thesis is concerned with health inequities. Its main focus is on primary healthcare, and in particular a vertical equity approach to healthcare that could be adopted in the London inner city borough of Lambeth. It thus has a particular Lambeth context.

Government policy has established the reducing of health inequalities as a key priority for many years in the UK with a series of White Papers, for example, *Saving Lives: Our Healthier Nation* (Department of Health 1999), *Building on the Best: Choice, Responsiveness and Equity in the NHS* (Department of Health 2003), *Choosing Health: Making healthy choices easier* (Department of Health 2004)) and *Equity and Excellence, Liberating the NHS* (Department of Health 2010) published by the new coalition government in 2010.

Despite the evident interest and policy direction of such documents, the gap between the health of patients from different socio economic backgrounds remains large. National life expectancy is improving at a faster rate than the life expectancy of patients in Primary Care Trusts in Lambeth who fall into the highest 20% of national deprivation (NHS Lambeth, 2009). Gregory (2009) argues the patterns of deprivation and mortality remain closely related to the patterns of a century ago.

In the case of Lambeth, the size of this gap is shown by the fact that male life expectancy of patients in the bottom decile of the Index of Multiple Deprivation (IMD) is 6 years

lower than a patient in the top decile (see table 1.1). The female life expectancy gap is four years.

**Table 1.1 Life expectancy in Lambeth by IMD quintile LSOA (source: London Health Observatory)**

Decile	Male			Female		
	Life Expectancy	95% CI	Population	Life Expectancy	95% CI	Population
1	71.9	(70.6 , 73.2)	14,109	78.4	(77.1 , 79.7)	13,992
2	72.8	(71.5 , 74.0)	13,801	78.7	(77.5 , 79.8)	13,808
3	73.3	(72.7 , 75.2)	14,371	77.8	(76.7 , 79.0)	13,740
4	74.0	(72.8 , 75.3)	13,795	79.8	(78.5 , 81.1)	13,113
5	75.9	(74.5 , 77.3)	13,977	79.8	(78.5 , 81.0)	13,078
6	76.3	(75.0 , 77.6)	14,648	81.4	(80.1 , 82.7)	13,772
7	76.5	(75.0 , 78.1)	13,585	82.2	(80.7 , 83.7)	12,845
8	77.3	(75.8 , 78.8)	14,128	81.6	(80.3 , 82.9)	13,155
9	76.9	(75.7 , 78.1)	13,910	82.3	(81.0 , 83.7)	12,468
10	77.7	(76.3 , 79.0)	12,773	82.5	(81.3 , 83.7)	12,117

Note: Decile 1 is the most deprived decile. Population refers to the average of the mid-year population estimates for 2003-07. Sources: ONS death registration data and mid-year population estimates & Department of Communities and Local Government, Indices of Deprivation 2007. Analysis carried out by LHO and EMPHO on behalf of APHO.

Not only are poorer patients more likely to die younger, they are more likely to lead less healthy lives while they are alive (NHS Lambeth 2009).

1.2 The specific focus of the thesis

Links between health outcomes and socio economic factors imply different options for policy solutions. One possibility is to address the underlying social and economic structures that lead to the differences in the socio economic conditions citizens face, and thereby the health inequalities associated with these differences. Such an approach while admirable in its intention is not the main concern here. First, it reduces the importance that can be attached to healthcare solutions which are important in themselves, and second, it may take some time for such a solution to come to fruition.

Establishing equity in healthcare as a policy aim is often presented as problematic by health economists who are preoccupied by measurement problems (Mooney and McIntyre 2007). This searching for ideal measures can prevent useful progress in pursuing a more equitable healthcare system, a pursuit that forms the central interest of this thesis. Mooney and McIntyre (2007) cite Sen in relation to the measurements of equity:

*“Waiting for toto may not be a cunning strategy in a practical exercise”* (Sen 1992)

This thesis does not suggest a complete solution to the measurement problem. It does however provide a practical and innovative approach to one aspect of it, that is, how to identify the socio economic disadvantage of individual patients.

The thesis proposes that it is possible to design a method to identify an individual patient's socio economic position when they register at a GP practice. This is a small, but significant aspect of an original approach to primary healthcare that, if implemented, could have a positive impact on the lives of patients from lower socio economic backgrounds and reduce associated health inequalities. This approach, of measuring individual socio economic position as a basis for a more vertical equity-based primary healthcare system, contributes to filling a gap in the literature on equity in healthcare.

The professionals interviewed in this thesis all acknowledged that the health of their patients is affected by lifestyle, and socioeconomic situations. For example one of the GPs, when asked what are the key factors that affect the health of his patients, stated simply:

*The influence of people's social factors is enormous and these sorts of factors added in to the usual mix of people being in the lower economic status are huge*  
(GP1)

Practitioners may get to know about the lives of the patients they see through conversations they have in the consultation room. However, such conversations are not guaranteed and time is increasingly being squeezed, making it difficult for GPs and nurses to go beyond the symptoms of the medical diagnosis (discussed in Chapter 7). Put more simply, there is no routine method of identifying an individual patient's socio economic background in the primary care setting.

This thesis aims to fill this gap, by developing and assessing an original method of identifying a patient's socio economic position by asking questions at the time of registration at a GP surgery.

The second dimension of the thesis is to analyse the perspectives of patients and professionals on the data collection method involved, and the potential uses of these data for targeting resources on patients in deprived socio-economic categories. This includes the extent to which professionals accept a vertical equity approach to healthcare.

The mix of providing a technical framework for targeting healthcare along with understanding perspectives of patients and professionals on issues relating to equity provides new possibilities for policy.

### **1.3 Lambeth**

Lambeth is an inner London borough with its northern boundary on the river Thames. It has long standing breadth of ethnic and cultural traditions creating a diverse population.

Lambeth's 2007 official population has been estimated as 273,249 (NHS Lambeth 2009) and in 2009 352,762 patients were registered with a GP practice. Even allowing for increases in population growth these differences are marked. Lambeth's population has considerable inward and outward migration both regionally and internationally. GP practices also have a high turnover of patients. One possible explanation of the difference between the population figures stated above is the delay in removing patients from practice registers when patients leave the borough. A different possibility is residents are more likely to register at a GP practice fairly quickly after entering the borough than complete census forms.

Almost half (45%) of Lambeth's population are aged between 20-39 - a younger population than the average for London as a whole. Approximately one third of patients registered with a GP in Lambeth are White British and 25% are from black ethnic minority groups.

Lambeth DataNet (2009) estimated over half of the registered patients speak English as their first language and the next most common languages spoken are Portuguese (3 - 5%), Spanish and French (Source: Datanet extraction 2009 <sup>1</sup>).

Between 2005 and 2007 both inward and outward flows of people from Lambeth have risen. Since late 2007, there has been a net increase in migration to Lambeth. According to Hollis (2009) this is likely to be caused by the credit crunch. This creates a population that is transient, and for GPs high turnover of patients, making the building of relationships more difficult.

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<sup>1</sup> Lambeth DataNet uses electronic GP records and survey data to estimate primary care data on issues relating ethnicity and health



## **1.4 Organisation of the thesis**

Chapter 2 provides a literature review of equity and inequality in health and health care, and seeks to establish a meaning for vertical equity in healthcare. The chapter challenges the view that a horizontal equity approach in healthcare is not sufficient to provide a way forward to reduce health inequalities, and establishes a clear definition of vertical equity that underpins the need to measure socio economic position: the challenge addressed in later chapters. Chapter 3 is the Methods Chapter, explaining the development of the questionnaire and data collection methods. Chapter 4 establishes benchmark and proxy measures of socio economic position. Chapter 5 analyses the data collected, using an original quantitative method for identifying the socio economic position of an individual patient, using simple factual questions that could be asked when patients registering at a GP practice.

The thesis then uses qualitative methods in Chapter 6 to analyse patients' perspectives on the research approach to identifying socio-economic position. The findings show that views on acceptance of these questions are complex and draw on deeper perspectives of equity. This is followed by another qualitative chapter that analyses a series of detailed interviews with NHS professionals in Lambeth exploring meanings of equity and a vertical equity approach to healthcare, as well as their opinions on the research method.

Finally a concluding chapter brings together previous chapter discussions to analyse the implications of this innovative research for practical use in primary health care, to allow GPs to target resources on their most disadvantaged patients. The conclusion also locates the research in the context of recent government policy proposals and the potential impact the findings may have on policy. Finally, it identifies areas for future research that have emerged from this thesis.



## Chapter 2

# Health and healthcare: the concept of equity: A literature review

### 2.1 Introduction

There are many forms of social inequity, but those that relate health to socio economic backgrounds are particularly objectionable. Sen (2002) succinctly states this position:

*“ ... health is among the most important conditions of human life and a critically significant constituent of human capabilities which we have reason to value. Any conception of social justice that accepts the need for a fair distribution as an efficient formation of human capabilities cannot ignore the role of health in human life and the opportunities that persons, respectively, have to achieve good health free from escapable illnesses. “*

The literature concerning the link between socio economic conditions and health outcomes is extensive. There is a long tradition in the UK of research into this link going back well into the 19<sup>th</sup> Century with the Factory Inquiry Commission in 1833 that looked at the conditions of workers in factories and Edwin Chadwick's *Report on the sanitary conditions of the labouring population of Gt Britain* (1842). These and subsequent investigations are well covered in the literature (see Davey Smith et al 2001 for a good overview).

The Black Report (Department of Health and Social Security 1980), Acheson's (Department of Health 1998) *Inquiry into Inequalities in Health*, and most recently the Marmot Review (Marmot 2010), albeit with different policy perspectives are unequivocal in arguing that the social and economic conditions of individuals in the UK lead to health inequalities.

The WHO (2008) and Raphael (2004) capture these positions well;

*"Social determinants of health are the socio-economic conditions that influence the health of individuals, communities and jurisdictions as a whole. These determinants also establish the extent to which a person possesses the physical, social and personal resources to identify and achieve personal aspirations, satisfy needs and cope with the environment."*

(Raphael, 2004)

*"These inequities in health, avoidable health inequalities, arise because of the circumstances in which people grow, live, work, and age, and the systems put in place to deal with illness. The conditions in which people live and die are, in turn, shaped by political, social, and economic forces."*

WHO (2008)

Sen's argument and the evidence for the association between socio economic conditions and health outcomes form the starting points of this thesis. Beyond the scope of the thesis, is the more contested debate on the complexity of causation between socio economic conditions and health outcomes. The research that underpins such quotes, and the body of

work in this area, provide confidence in the link between health and social and economic conditions. However beneath such general descriptions as those of the WHO (2008) there also lie different interpretations of the meanings of the term equity, inequity, equality and inequality. What equity and inequity mean is far from clear and there is much confusion in the literature.

Any literature review requires boundaries (Hart 1998); partly for pragmatic reasons when there is an abundance of literature. For example, according to Williams and Cookson (2000), a literature review on equity in health in Social Science journals alone yielded over one thousand articles in the twenty years before their paper. Perhaps more importantly though, it needs boundaries provide context and focus for the specific research question.

My research question is primarily concerned with investigating an equitable approach to providing primary health care that is based on information concerning the individual patient. Central to this approach is, first, an acceptance of the role that socio economic factors play in all aspects of health, and the view that healthcare policy makers should recognise this in design of the healthcare system. Second, in order to develop an equitable system, the socio economic position of individual patients needs to be identified. Finally, I explore the extent to which a vertical equity approach to healthcare should be considered, including patients' perspectives on this approach. The meaning of the concept of equity is explained later in this chapter.

While acknowledging that issues of inequities in health are of global policy concern, the focus of this chapter is on the literature (including international literature) that relates most directly to the research question, which is, identifying socio economic position as a basis to improve equity in primary health care in the UK. The focus on the UK is important since meanings of equity are culturally shaped, and understanding equity requires recognition of

the diversity of cultures and cultural values with which health systems operate (Mooney 2007).

This review first distinguishes between concepts of equality/inequality and those of equity/inequity. These terms along with others such as health disparities are often used synonymously. The chapter provides a distinctive definition of these terms for the purpose of this thesis using existing literature. Second, the chapter provides a detailed review of the concept of equity in relation to health, healthcare and its link to policy. An important part of this discussion is explaining the meaning of socio economic position. The discussion concludes by identifying a perspective on equity that will be used to inform a potential approach for primary care in the rest of this thesis.

Literature in this field is both quantitative and qualitative, and draws on different fields of study including economics, ethics, public health, sociology, philosophy, social policy and others and contains an abundance of different definitions. McLachlan and Maynard (1982) sum up this confusion stating:

*“...equity, like beauty, is in the mind of the beholder...”*

That the concept of equity may draw upon different philosophical traditions is not really surprising. Notions of fairness have roots in different traditions across the world, whether in reference to a supreme authority such as God in Islam, ideas of cosmic order and dharma (Hinduism) or Aristotelian ideas of natural rights and legal rights which have roots in European ideas of justice (Pappas and Moss 2001).

Examinations of fairness have often used Rawls's (1971) concept of social justice.

Maynard (2007) argues that perspectives on health and healthcare equity often have covert

ideologies embedded within them. On one hand there are the egalitarians who are primarily interested in equality of access and opportunity, and on the other hand, there are libertarians who have freedom of choice including choice in health and health care as their maxim. These two ideologically opposed viewpoints permeate debate on equity and are evident in statements by theorists and policy makers alike.

That health equality and equity are shaped by political ideology is reflected in this thesis through discussions of policy implications of different perspectives on equity. The role of government in formulating policy, and the commissioning and publishing of research is influenced by political ideology (Carlisle 2001).

Health care systems have to distribute resources according to need, but it will be argued that a broader definition of need is required than a notion of equality of access, or equality of treatment based on a narrow definition of medical need. If there is an acceptance of the broader role that social and economic factors play in determining health outcomes, it should also be acknowledged that health care should be organised to respond to these factors that affect all aspects of access.

This chapter outlines the key literature for this topic.

## **2.2 Equality, Inequality and Equity**

The primary analytical concern of this thesis is the concept of equity. However it is necessary first to discuss the concept of equality, not least because the terms are sometimes used synonymously and sometimes differently. Clear definitions are essential for drawing policy implications concerning how resources are allocated in healthcare.

Dictionary definitions make the distinction quite clear with equality/inequality referring to equal distributions. For example

*“ the state of being equal”* Oxford English Dictionary

Such a definition is quantifiable by nature, and implies the ability to measure states of equality. Graham (2007) states that measures of health inequalities are descriptive involving no moral judgement.

That position, that the concept of equality is neutral, without moral basis, can however be challenged. Whitehead (1990) points out that in some countries inequality is treated as a mathematical measure, a numerical distribution, while others use it as a term for unfairness. She adds that this distinction is further blurred when there is only one word to cover both inequality and inequity in some languages.

There are various methods by which different distributions may be compared, in order to reach conclusions about differing levels of inequality. There are also different measures used to interpret distributions such as the standard deviations, coefficient of variation, Gini Coefficient and the Lorenz Curve as well as welfare measures such as Atkinson's measure. The choice of measurement, far from being without a moral basis, has embedded value judgements (Williams and Doessel 2006) since different measures provide different results, with different implications for policy. For inequality to have meaning it has to be measured and it is the measurement that contains subjectivity. As Amiel (1998) states:

*“Inequality measurement involves explicit or implicit value judgements. The subjective approach to inequality measurement is a relatively new and fast-developing area which*



*focuses direct attention on these judgements. It is "subjective" in the sense that it takes account of people's views on distributional comparisons "*

It has been argued that greater inequality impact greatly on health outcomes. Put simply, in more equal societies average life expectancy is higher and average health outcomes better (Wilkinson 2005). These theories have been contested, see Lorgelly and Lindley 2007, who argue the complexity of confounding variables make firm conclusions regarding income inequality at a societal level and health outcomes at the individual level hard to draw.

Equity, in contrast, is concerned with fairness, and has a clear moral and ethical dimension (Whitehead 1990). Le Grand (1991) describes how terms such as equity, justice and fairness are often treated as synonyms.

Black and Mooney (2002) further make the point, that if equality of health states was a prime concern of equity, it would mean an imposition of a target health state for everyone – regardless of their wishes. Once we move away from equal health states as a definition of equity, we allow wide scope for interpreting what we mean by equity.

There is, then, a distinct and important difference between equity and equality. Equality is about distribution, whereas equity is about fairness. The distinction between these concepts, when examining health, is important not least, it will be argued, because 'doing things' unequally can be equitable. Equity thus explicitly is concerned about differences between individuals, and whether these differences are fair. This thesis is primarily concerned with equity.

## 2.3 Equity and health

The importance of the distinction between equity and equality lies in the ways in which concepts of equity (and equity in healthcare – see below) are each tied into notions of equality. Mooney et al (2002) describe a spectrum. At one end are those writers primarily interested in equality of welfare, and they liken this position to the work of Culyer et al (1992). The other end of this spectrum is more concerned with equality of resources and opportunities – what people do or achieve with these resources is less of a concern. It is more a matter of preferences and how well people can utilise resources. Mooney et al (2002) further cite two possible examples that lie between these two extremes i.e. Sen's (1980) equality of capabilities and Arneson (1989) equal opportunity for welfare.

Where there is more confusion is in identifying definitive meanings of the idea of fairness.

Whitehead (1992) is often cited as unpicking this problem successfully. She proposes a criterion for assessing whether an unequal distribution should be regarded as equitable or inequitable. She stresses seven factors that explain health differences:

- i) Natural, biological variation
- ii) Health damaging behaviour if freely chosen
- iii) Transient health advantage of one group over another when first adopting a health promoting behaviour (so long as other groups can catch up soon)
- iv) Where lifestyle is restricted in ways that lead to worse health outcomes
- v) Where there is exposure to living and working conditions that are stressful;
- vi) Where health and public services are inadequate
- vii) Where sick people move down the social scale.

(Whitehead 1990 )

Central to Whitehead's equity criterion is the extent to which different health states are avoidable or inevitable. She argues that differences that are based on causes (i) – (iii) are unavoidable and inevitable so do not fall under concerns for equity, whereas causes (iv) – (vii) are avoidable or not inevitable and are therefore inequitable causes of health differences.

This distinction is useful and can be used to illustrate how equality and equity are interlinked, but not synonymous. Natural or biological variations and health damaging behaviour can lead to inequalities in health, but these differences are not inequitable on this definition as they are unavoidable. Other inequalities in health are socially and economically determined and, according to Whitehead therefore involve inequity.

Whitehead and Dahlgren (2007) state the position clearly

*“In today's Europe, working out what social differences in health are fair or unfair is unnecessary. Essentially, all systematic differences in health between socio economic groups within a country can be considered unfair and, therefore, classed as health inequities... Summing up briefly, social inequities in health are directly or indirectly generated by social, economic, and environmental factors and structurally influenced lifestyles.*

Whitehead's basis for equity, as determined by what is within the control of the individual was also put forward by Le Grand (1982, 1987). He discussed equity as dependent upon the degree to which health outcomes are within the control of the individual:

*“ If an individual's ill health results from factors beyond his or her control then the situation is inequitable; if it results from factors within his or her control then it is equitable “*

With this focus on the individual's capacity for agency to control health, Le Grand's (1982) discussion is compatible with a view that equity is not primarily concerned with equality of outcomes.

A key problem with both Whitehead's and Le Grand's position is the extent to which individuals really have choice in their health outcomes. The debate around obesity can be used to highlight this critique. It can be argued that most people know what is 'healthy' to eat and 'unhealthy', yet levels of obesity have increased (NHS 2011). Is it then that individuals are responsible for their own food choices and the outcomes are therefore not a concern for equity? Or are differences in obesity between people inequitable? Since differences in obesity levels of both men and women can be shown to be associated with a range of socio economic factors, they are treated in this thesis as being possibly inequitable – the criterion for equity should go beyond a narrow idea of self control.

A further critique of Whitehead's inequity criterion questions whether it is right to exclude inequity in the case of differences arising from causes (i) to (iii). It will be argued now that each of these criteria can to a different extent generate inequity.

Sen's work on capabilities and functionings can be used to examine this question. Sen (1985) distinguishes between what he describes as functionings and capabilities.

Functionings are what a person achieves or what he or she manages to do. In respect of health, this could be their health states. Capabilities describe the abilities and opportunities for an individual to achieve a given functioning – so with respect to health the opportunities to be healthy, for example.

As a critique of Whitehead, this is a useful distinction. For example cause (ii) is based on an individual's decision to behave in a way that leads to poor health. It can be argued that an individual's set of capabilities could be such that a person could achieve a good health state (their functionings) but choose not to. It is also possible though, that they may not have such a set of capabilities to achieve good health. Further as Sen (1992) argues, capabilities should relate to genuine choice over many options, and such capabilities need to be judged on their quality as well as quantity (Clark 2008).

Whitehead's second cause (health damaging behaviour if freely chosen) emphasises that there is free choice to undertake health damaging behaviour, but is unclear on what constitutes free choice. A capability set that would lead to poor health denies individuals the choice of good health and that capability set will be socially and economically determined. Further, even when an individual is faced with a capability set that can achieve good health, there may be social or cultural conditionings that stop that individual using their capabilities to achieve such a functioning (Clark 2008.) If this argument is accepted then such health damaging behaviour is in itself socially and economically determined and therefore an issue for equity. Gasper (2002) questions whether the notion of free choice is of any value in defining equity.

That Whitehead's first factor, natural or biological variations affecting health outcomes, is not an equity concern is at face value difficult to contradict. However, two points should be considered. First, given an individual's biological make up, would the social and economic conditions they face affect how these natural factors manifest themselves? And second, when a medical condition emerges, do social and economic factors have a role in how well an individual manages their condition? Ignoring natural or biological variations completely could provide an excuse for ignoring important socio economic factors that inter- play with this natural explanation of health differences. As Blane et al (1993) state

most simply, nature does not decide that children born in poor families should die at twice the rate of children from rich families.

Whitehead's third causal factor generating differences that she does not regard as inequitable - groups who in a temporarily unequal position - is perhaps less controversial. Nevertheless, there are questions about what is temporary, whether there are long term effects of having to catch up.

Limitations of a choice approach can thus be seen to centre on the ability to make right choices. Individuals do not have the same level of skills in using and choosing how to utilise resources available to them (Sen 1985). This inequality of capabilities can lead to situations where people with more need for health care are not able to exert agency to utilise services adequately to respond to their need, thus compromising equity goals (Schafer 1994). Sen's argument for improving health equity is based on the need to improve and to have more equal capabilities. Improving and developing capabilities enable individuals to achieve more equal health states.

Sen's work therefore influences this thesis in several ways. By including capabilities in the framing of the concept of equity, Sen's approach enables a broader interpretation of what is required to reduce health inequities. For defining equitable health care, it will be argued that such a broader approach requires healthcare policies that go beyond a narrow view of response to clinical need, to encompass a more socially and economically determined view of need. As Sen (2003) states

*"What is particularly serious as an injustice is the lack of opportunity that some may have to achieve good health because of inadequate social arrangements, as opposed to, say, a personal decision not to worry about health in particular"*

When equity is viewed as including the opportunities to achieve good health, with all the socio, economic and cultural dimensions that influence such opportunities, vertical equity can be a basis for progress in reducing health inequalities.

The WHO (1985) similarly highlights the importance of equal opportunity to achieve health potential as a central condition for equity in health. Where this opportunity is avoidably prevented then inequity occurs.

Goddard and Smith (2001) further argue that perceptions of treatment and of choices are not only shaped by the individual patient's socio economic background. They also have a supply side determinant in the way in which practitioners have different propensities to offer treatments to patients from different socio economic backgrounds.

Arneson's (1989) aim of equalising opportunity for equal welfare states resonates with a similar position regarding equity. It implies that unequal health states are equitable if the opportunity to achieve equality is available to individuals who do not express the preference to take up the opportunity. What is less clear in Arneson's description of equity is the extent to which opportunities are socially and economically determined. It would be argued here that such opportunities are socially and economically determined.

LeGrand (1984) uses the concept of envy and linking this to equity. Economists such as Foley (1967), and Varian (1974) have also discussed the concept of envy and how it relates to equity. Le Grand (1984) explains the concept with a metaphor of sharing a cake, where one person cuts it and the other person chooses her portion. The outcome of this should be free of envy and an equitable outcome.

The concept of envy has been applied by Mooney (2002) in relation to health care, who explains how this can be related to the concept of vertical equity (discussed in the next section). Mooney, in discussing the problems of comparing different perceptions of health care both within and between different cultural groups, suggests that the concept of envy maybe of some use, if the aim is to equalise levels of envy between groups/communities. Mooney (2000) states

*“This would mean that, in these terms, equity would be achieved when group A accepted that they were equally as well off as they (group A) perceive group B to be and group B ‘reciprocated’ (i.e. each group was as envious of the other). What we would need is that group A are as envious of group B’s bundle of health care resources, given B’s health status, as group B are of A’s, given A’s health status”*

An advantage of this position is it involves a reciprocal measure of each other’s health care allocation, and moves beyond examining perceptions by individuals. Ideas of social justice and equity, by their relative nature, require comparison between groups of individuals or individuals.

However the problem that Mooney (2000) goes on to cite is that the attempt to equalise envy between the groups does not recognise that different individuals and groups have different abilities or capacities to envy.

Taking this thinking a little further, people may not be envious even when there are clear injustices. Socialisation may leads to this. Le Grand uses the caste system as an example. If an individual is from a tough working class housing estate, then it is quite possible that faced with extreme poverty, perhaps crime/violence, social and emotional deprivation, that individual, with even quite a serious illness, may not be greatly envious of a different



individual's health state. Or at least they may have less envy than another person would, as they are more concerned about the other factors that are affecting their well-being.

## 2.5 Equity and healthcare

Equal and unequal distributions, and how they relate to equity in healthcare, can be distinguished using the concepts of horizontal and vertical equity.

Mooney (2000) explains these terms as

*“ horizontal being the equal treatment of equals and vertical being the unequal but equitable treatment of unequals, the distinction between the two can be put more bluntly. Vertical equity is about positive discrimination ”*

Put differently individuals with the same medical needs will be treated equally under horizontal equity regardless of other considerations such as different ethnic or cultural backgrounds or their socio economic circumstances. In this thesis, vertical equity seeks to take account of one of these 'other considerations' namely the individuals' socio economic circumstances and argue that health care to be deemed equitable must respond to that situation.

So for example, consider two patients who have different medical conditions, the first requires two units of healthcare resource and the second requires four units of resource due to a more complex clinical condition. A horizontal equity approach would treat each patient equally depending on their medical need, so the first would get two units of healthcare, the second, four units of healthcare. However, a vertical equity-based approach recognises that some patients require greater resource allocated to them due to their socio

economic circumstances. So suppose for example, in this case, it is a poorer patient who has the second condition. Then instead of receiving 4 units of resource, he or she would receive, say, eight units to compensate for the socio economic circumstances that led to the worse health outcomes.

Such vertically equitable healthcare might include preventative care, treatment and follow up care, where these social and economic circumstances create barriers to good health for deprived individuals that individuals with better social and economic circumstances do not face. Under vertical equity, patients from lower socio economic positions with the same medical need require more health care resource than the less deprived. It follows that individuals from different socio economic backgrounds will have to consume different amounts of health care to meet their needs (Gravelle et al 2006). Vertical equity thus encompasses a broader definition of need, that acknowledges the role of socio economic factors in determining health and is prepared to engage in positive discrimination to tackle that need.

In contrast, horizontal equity applied to health care requires a sense of equalisation, but equalisation of what?

One possibility is typified by the 'equality of resources' argument. This is the view that equity is achieved through equality in the distribution of initial resources available to an individual (or class of individuals). Inequalities in the distribution of what is then achieved with these resources are deemed irrelevant to the issue of equity (Mooney 2002). This approach does not concern itself with equality of health outcomes.

Culyer and Wagstaff (1993) point to early work of Mooney (1983, 1986) and Le Grand (1982, 1987, 1991) which identified equality of expenditure per capita as a possible basis

for equity, based on this notion of equality of resource allocation. Equality of expenditure ignores however the importance of varying individual need embedded in vertical equity concepts, since it is a population-based criterion.

In challenging this position, Whitehead (1990) argues a policy that aimed to equalise resource allocation between groups, perhaps by geographical population e.g. equal per capita expenditure is inequitable since it will have no relation to medical or broader need.

Furthermore, an equity goal based on setting a resource target such as equal per capita expenditure, while having the attraction of being measurable and implementable, says little about how resource are used and how individuals vary in their ability to use such resources where capabilities vary between individuals (Sen 1985 ).

Nozick (1974) argued for the rejection of equality of distributive entitlement. When applied to primary health care, this proposition would mean that patients, as long as they are acting fairly and legally, are entitled to whatever healthcare resources they can acquire. The problem for healthcare is that patients do not have equal entitlements based on social and economic factors. It is argued in this thesis that in contrast a vertical equity approach is required.

Whitehead (1990) offers a working definition of equity in health care as focusing on three areas: equal access to available care for equal need; equal utilisation for equal need; and equal quality of care for all. While she does not explicitly use the term, this is in essence a horizontal equity approach.

## **Access**

Access is often used as a criterion for equity and has different possible interpretations.

Goddard and Smith (2001) view access or opportunity to use health care as predominantly a supply side issue. Utilisation, or realised access, also includes demand. However, the two sides interact.

The demand for primary health care could be seen as a decision involving valuing the benefits and costs of that care. However making such a valuation is a complex measurement problem. This is in part due to the difficulties in measuring the benefits of treatment. Williams (1999) argues that individuals from different social and economic backgrounds perceive the treatment they receive as being of different value, even if in clinical terms it would seem identical.

The basis of access is understood as opportunity to use health services. This is described by Thiede (2005) as the freedom to use health services.

However, availability of health care is also argued to be insufficient to lead to equal utilisation according to need, not least because it ignores budgetary constraints. Goddard and Smith (2001) state the case simply. Even with identical prices, a rich person faces a different set of constraints to accessing care from a poorer person. This view of access is reinforced by Birch and Abelson (1993) who maintain that it is the equalisation of actual treatment (utilisation) according to equal need that is central to the definition of equity of access. However, if the opportunity costs of that treatment, whether it be financial or non-financial, are different for individuals, then this approach would not lead to an equitable outcome. Because of this complexity, utilisation has been chosen as a measurable proxy variable for access – what Aday and Anderson (1981) describe as ‘realised access’.

Individuals may however, also not choose to utilise health care, thus expressing a preference not to use health care (Oliver and Mossialos 2005)

Moving from available health care to actual usage relates to Whitehead's (1990) second criterion for equitable healthcare, that of utilisation.

Gilson (2007) further states (p142)

*"...acceptability and trust barriers have an invidious influence over health care equity in all contexts"*

Thiede et al (2007) argue that acceptability is a key determinant of unequal utilisation of health care across socio economic groups. Furthermore utilisation within a health care system, when attempts are made to measure it, may reflect decisions by individuals to access alternatives outside the formal system that they find more acceptable (Goddard and Smith 2001)

The problems in defining access in relation to equity are matched by different interpretations of need.

## **Need**

Economists such as Le Grand (1992), O'Donnell and Propper (1991), Wagstaff (1991) and the philosophy literature as identified by Culyer and Wagstaff (1993), Gillon (1986) and Williams (1962), define need by linking it to ill-health. Put simply, there is a need if someone is ill, and while there is an issue as to who decides who is in ill health, this definition would seem to have an intuitive appeal.

Culyer and Wagstaff (1993) however explain that need for treatment is in itself not adequate as a basis for measurement of equity in health care. As Culyer (1976) and Williams (1998) argue, it is the capacity to benefit that is important. For example need in terms of ill health is only a concern for equity if there is available treatment. So what is required is an idea of the ability to improve health – hence the notion of capacity to benefit. The authors accept there may be cases (palliative care for example) where the capacity to benefit is limited but care still has value.

Culyer (1995) argues this definition in terms of capacity to benefit meets the following list of criteria. For a definition to be useful, it is necessary

1. That its value content is up front and easily interpretable
2. That it be directly derived from the objective of the health care system
3. That it is capable of empirical interpretations of horizontal and vertical distributions
4. That it should be person- and service-specific
5. That it should be linked straightforwardly to resources
6. That it should not produce inequitable results

Culyer (1995) argues that any concept of equity, whether horizontal or vertical, is of no use in operational terms if it cannot be quantifiably judged. Measuring a marginal capacity to benefit and reducing the marginal capacity to benefit to zero would mean all such needs would be fulfilled. Culyer (1976) is concerned with the ability to measure need, hence the preoccupation with capacity to benefit rather than just with ill-health. Barry (1965) also emphasises that the notion of need has to be seen in the context of available positive treatment not of unavailable or bad treatment. This is a similar line of reasoning to Culyer and Wagstaff (1993).

While capacity to benefit could be used for measurement, it doesn't explicitly tell us how much health care an individual should receive. Culyer and Wagstaff (1993) address this issue by citing Weale (1978), the implication of whose work is individuals should receive the health care that equalises health states.

## 2.6 Policy

Equity has been embedded in health care policy in the UK in various guises for over a century. The 1911 National Insurance Act was, according to Maynard (2007), partly instigated by concerns over the health status of recruits to fight in the Boer War

The influential Black Report (DHSS 1980) can be argued to have laid the modern foundation for the UK's policy commitment to equity, which is preoccupied with reducing inequalities in health states. The Acheson inquiry (1998) established a renewed target of reducing health inequalities which focused on alleviating avoidable inequalities and made equity concerns of central importance. The approach advocated within the Acheson (1998) report was broad, encompassing all of Beveridge's five giants: want, ignorance, disease, squalor and idleness (Black 2000). This thesis supports the expressed commitment to reducing inequalities outlined in the reports above, and places primary healthcare as having a fundamental role to play in achieving this aim.

References to equity in many policy documents are numerous, but are often vague in meaning and used interchangeably with issues of equality. Recently the new coalition government in the UK published *Equity and Excellence: Liberating the NHS* (HMSO) 2010. This report is an example of a document where meanings of equity are unclear and ambiguous.

At the heart of the NHS paper is the notion of patient choice, echoing earlier discussions in this chapter about freedom to choose. At the same time issues of quality of care, along with improvements in efficiency, are considered. While choice, quality and efficiency are not mutually exclusive ambitions, it is not clear throughout the paper what is meant by equity, apart from some notion of a patient being free to choose where to be treated. There has often been a conflict within policies which state equity aims (however vague) on one hand, and at the same time the need for cost containment, often described as efficiency on the other hand, with the consequence of confused strategic aims (Vagero 1994). Sheldon and Smith (2000) make the point that it is when resource constraints face health needs that debates around equity become most heated.

Within the White Paper there is no recognition that a patient's ability to choose can be socially and economically constrained. Neither is there a sense that need goes beyond a narrow clinical definition which includes social and economic determinants, and as such the document precludes a vertically equitable approach to health care to address health inequalities.

What this means for equity is unclear, but Maynard (2007) challenges earlier reforms by stating

*“With libertarian wolves prowling ubiquitously in egalitarian sheep's clothing it is essential to confront all reform proposals with scepticism. All too often such efforts are poorly disguised attempts to redistribute resources from sometimes weakly performing collective health systems to rich interest groups served by libertarian advocates!”*



Moreover, while the word equity may appear in many health policy documents, Black (2000) argues there is an underlying belief that economic growth is the real driver for improved health care and the reduction of health inequalities.

When equity has been formulated more clearly in policy documents it is usually expressed in terms of horizontal equity. Horizontal equity in health services requires that there are no differences in services between patients with equal medical needs. Vertical equity, in contrast, requires that there are greater or enhanced services for patients whose broadly defined needs are greater due to their social and economic circumstances (Starfield 2001)

Vertical equity policy solutions are often overlooked or considered problematic by policy makers. Taylor's (1992) research in a number of different countries argues that equity based health care should be concerned with demonstrable need, with proportionately more resources allocated to those in greater need.

This last example highlights the difficulty in interpreting equity. A horizontal equity interpretation of Taylor would take the argument to mean that patients with the same medical needs be treated equally regardless of their socio economic position, while patients with greater medical needs require greater resource. However, a vertical equity interpretation could also be made: in this view, 'demonstrable need' recognises and includes the role that socio economic factors play in health.

In the latter interpretation, Taylor's approach can then be seen to be consistent with a vertical equity approach, when the extra resource is provided in response to the additional need arising from social and economic circumstances. While there be arguments around measuring what proportionally more resources might mean, it is an important starting

position for reducing health inequalities. This thesis, with its method of measuring socio economic position, is a move towards such an approach.

Furthermore, if responsibility is devolved to local communities, identification of need and more accurate assessment of resource usage and effectiveness will be improved. There are several reasons why this is the case. First, local citizens will gain a greater understanding of the health care system they participate in and thus improve their ability to make informed decisions. Second, local preferences will shape the allocation of resources to people who are directly affected by and involved in the outcomes of decisions made thus improving accountability. And third, there is an intrinsic fairness to include the values a local community hold in the decisions that are made concerning their healthcare.

If the ultimate aim for equity in a health care system is to reduce health inequalities that are socially and economically determined, this will require there to be large differences in access and utilisation of health services. Individuals in lower socio economic positions with greater broadly understood need should have greater levels of access and use in order to address the same medical needs (including preventative care) as individuals in higher socio economic positions. Giraldes (1988) uses the term 'positive discrimination' for this type of approach and demonstrates how when such an approach was adopted in Portugal, resources were reallocated from the South to the North of the country.

This approach is equitable as it is addressing need on the most complete social and economic definition. Implications of this vertical equity approach to policy in primary care would lead to an imbalance in resource allocation, but a fair one.

Essential to implementing a vertical equity approach to primary health care (the concern of this thesis) is the identification of the social and economic position of patients. Later

chapters outline a method for doing this, along with both patient and professional views on perspectives on equity. Given the importance of socio economic position to vertical equity it is essential first to explain the meaning of 'socio economic position'.

## **2.7 Socio economic position**

The concept of socio-economic position is not defined easily. Socio-economic conditions of individuals are described in many different ways. Terms frequently used include social class, social status and socio economic position, often used interchangeably in ways that suggests there is no difference between these concepts. Sociological and economic literature also shows that these concepts can be measured in varying ways – in fact the variety of ways of measuring each of these concepts sometimes overlap, such as the use of education as a measure for all three concepts. Understanding the meaning of a measure allows for the development of causal narratives (Marshall 1997)

Most measures of socio economic conditions have some derivation from the writings of Karl Marx and Max Weber (Galabardes et al 2007). Marx's work, primarily focusing on structural relationships between the individual and the means of production, can be seen to influence the more social class-based measures of socio economic position (see below).

Weber's stratification, while accepting the role of social class, has a more layered basis for stratifying individuals. Individuals' life chances are shaped by how individuals use their attributes such as education. The importance Weber gives to status attained through a person's occupation is evident in measures such as the National Statistics Socio Economic Classification (NS-SEC see Pevalin, D. and Rose, D. (2001)).

Krieger (1997) distinguishes between social class and socio economic position, defining social class as a social category assigning individuals to social groups based on their economic and legal relationships with others (and as a categorical variable); whereas socio economic position, includes both resource-based and status-based measures, placing people in a hierarchy or rank position in society.

Social class and socio economic position are thus not synonymous, although measures of socio economic position in some cases have historical roots in social class-based measures (see NS-SEC). This difference can limit the usefulness of socio economic position in explaining causal associations between socio economic position and health outcomes. An example of this problem can be seen in Chapter 3, in the discussion of education and its links to health, and the role that social class may play in this association.

For this thesis there are particular measurement benefits of using socio economic position, as highlighted by Krieger (1997)

*“ socio economic position pertaining to material resources can be modelled as ordinal or interval categorical variables; socioeconomic status and other ranked hierarchical measures may be modelled as continuous variables (assuming no threshold effects), with cutpoints, if any, based on the structure of the data (e.g. quintiles)”*

For this thesis, an ordinal variable is required since identifying an individual's social and economic conditions in relation to others is central to its approach. There is a requirement to be able to rank patients by their socio economic position. Moreover, as will be explained later, a definition of socio economic position can capture a range of assets, consumption and status-based factors that have strong connections to health outcomes. For these

reasons, socio economic position was selected, following Krieger (1997), as the measure of an individual's social and economic conditions.

As Krieger et al (1997) summarise their view, there are no single factor explanations of the socio economic determinants of health, not least because different factors have different associations with health outcomes. Moreover different socio economic factors have some relation to each other (Naess et al 2004). In meeting the requirements for a measure or measures outlined above, it is therefore not the intention to argue that there is a perfect indicator.

Davey Smith et al (1998) make the point that at different stages of the life course different socio economic factors will have different impacts on health outcomes. The choice of indicators for this research and their justification is outlined in Chapter 3 (Methodology).

The links between socio economic position and health outcomes may however mask important cultural factors that also affect health. Such cultural dimensions may not be picked up adequately by some measures of socio economic position. Such dimensions may include ethnicity, religion, and gender. Currie (2011) gives the example that African Americans are more likely to live near environmental hazards than their white counterparts, leading to poorer health at birth. This points to factors that go beyond the narrower focus on economic factors. Deaton (2011) discusses racism as a particular barrier to good health:

*"...the daily stress of living in a racist society is itself thought to be a cause of poor health outcomes."*

Mooney (2007) in discussing the lack of advances in relation to healthcare and equity argues there has been insufficient thought by economists about the importance of culture in health and healthcare. That culture is often ignored is perhaps surprising since the poorer health outcomes of many indigenous people across the world, compared to the larger populations they live alongside, is widely recognised, for example in Australia, Canada, Latin American countries and New Zealand (Islam et al 2010).

Health inequities that are presented as associations between socio economic position and health outcomes may ignore cultural influences because of the chosen measure of socio economic position. Chaturvedi (2011) argues for example that cultural determinants of health, both positive and negative, are often believed to be subsumed in the more easily measurable indicators of socio economic position, but at the cost of missing important causal links to health outcomes. The findings from the interviews with health professionals (see Chapter 6) raised the concern that long standing measures of socio economic position lacked cultural sensitivity and can mis-classify a patient's socio economic position.

## **2.7 Conclusion**

The introduction to this chapter emphasised that a broader definition of need than one based just on medical condition includes the role socio economic factors play in determining health states. Such a definition of need is required to address the health inequalities that exist in the UK. It requires an acceptance of the role that social and economic factors play in determining health, and that health care should respond to these factors.

The individual is central to the approach developed in this thesis. As Campbell et al (2000) argue, good quality care is at its most effective when adapted to the individual user not in the sense of a libertarian freedom to choose criterion, but as an approach that accepts that individuals have different medical needs that are both clinical and social and economically determined. If this broader definition of need can be identified, then a more vertically equitable health care approach can be adopted to reduce health inequalities.

To adopt a vertical equity approach to health care discussed above in a primary care setting, it is first necessary to identify accurately socio economic differences between individual patients. It is also necessary to do this in a way that is acceptable to patients in different socio economic positions. In thinking about identifying socio economic position of individuals, we move towards accepting that micro interventions matter (Klein 2000).

The next chapter sets out a method to establish a basis for this identification, a first step towards a vertical equity-based approach based on the individual patient.

# Chapter 3 Methodology

## 3.1 Introduction

Chapter 2 explained the theoretical basis for the research. It explained that a vertical equity approach in primary health care is one that is based on socio economic determinants of health. It further established that the basis for a vertical equity approach must be the socio economic classification of individual patients. This chapter sets out the methodological approach undertaken in the research. The aims of the methods outlined in this chapter can be summarised as:

- (i) to classify individual patients by their socio economic position
- (ii) to develop selection criteria using proxy questions that can be used by GPs to identify patients in low socio economic positions
- (iii) to explore perspectives of patients on the methods' acceptability and their views on equity in healthcare
- (iv) to establish practitioners' views on equity and specifically on vertical equity

There are three main components of the mixed methodology adopted in this study:

### 1. Theoretical Framework

The theoretical grounding for the thesis was established in Chapters 2 with a literature review that located a vertical equity approach as one based on the social and economic background of patients.



## 2. Quantitative method

This component is used to devise an original method to classify patients by socio economic position, with a particular focus on identifying those in low socio economic position. It is also used as the basis for devising a set of criteria that can be used as the basis for the practical application of this research.

## 3. Qualitative method

This element of the methods establishes both patient and professional perspectives on identifying a patient's socio economic position using the method developed. The results are also used to help formulate criteria for practitioners who may wish to adopt the method developed in this research.

The distinction between quantitative and qualitative approaches can clarify the research analysis. However, Mingers (2001) argues this is not the same distinction as between a positivist (quantitative) and interpretivist (qualitative) approach. Yin (1989) argues it is the data that is obtained from both qualitative and quantitative analysis that distinguishes between positive and interpretivist methods. It is argued here, that the two methods of analysis are complementary and both needed for addressing the research question.

This Chapter first outlines the study population, ethical considerations and administrative processes, before explaining and justifying the research methods strategy and the research instruments in more detail.

## **3.2 Participants and ethics**

There are two main groups of participants in this research – patients and NHS professionals.

### **Patients**

The study population comprised patients from the London Borough of Lambeth. Lambeth is one of 13 boroughs that make up inner London.

As discussed in Chapter 1, Lambeth has a highly diverse population across different social and demographic variables. 38% of Lambeth's population is from ethnic minority backgrounds, and 50% are white British (2001 Census). 11.4% of the population is aged over 60, whilst 19.9% are aged under 18. (2006). Over 130 languages are spoken in the borough. After English, the two leading most spoken languages spoken are Yoruba and Portuguese (2008 Pupil Survey data) The differences in the figures above compared to those outlined in Chapter1, Section 1.3 (e.g. White British) may be explained by the fact that the above figures relate to the population of Lambeth, while those in Chapter 1 are registered patients.

On a wide range of health indicators, Lambeth's population have poorer health and lower life expectancy than national averages. For example life expectancy gaps in 2004 were 3.2 years for men and 1.2 for women (Lambeth Primary Care Trust). The 2007 Index of Multiple Deprivation (IMD) places Lambeth as the 5th most deprived borough in London and 19th most deprived in England.

It was agreed by the NHS ethics committee (to which this project was submitted) that patients could participate so long as they had the ability to give a properly informed

consent. The proposal obtained ethics clearance after restricting participants' ages to between 16 and 75 years of age and to those who were not on the practices' mental health registers. Participants also had to possess a command of English sufficient to understand what was being requested of them, and to be able to answer the questions. Alternatively, they had to have access to an interpreter while the questionnaire was administered. The questionnaire was available in Spanish and Portuguese and it was possible to conduct interviews in Spanish or Bengali.

The practices were chosen to provide a geographical and socioeconomic diversity in the sample. One practice was in the North, another in the South, and the third in the South West of the borough. The target population for the sample was therefore the patients registered at the three practices recruited for this study. The particular practices were selected through discussions with GPs who were willing for their surgeries to be involved in this project.

An explanation of the project and invitation to the three practices led to each agreeing to take part. Practices were met to discuss the project aims and explain what participation in the project required - access to a room for interviewing, patient appointment lists and addresses, and verification of which patients were on the mental health register.

Patients were all interviewed at the practices. Three to six sessions a week (an average of four) were undertaken, where a session was a half-day at the practice. To avoid pressurising potential participants, people who had an appointment booked were mailed a covering letter from the practice and a project information letter prior to their appointment. The project information letter outlined the aim of the project to the patients. It outlined the aim was to find out more about patients background in order to improve the healthcare that

practices provide. Patients were then approached for participation by the interviewer on the day of their appointment. .

A number of issues were encountered with respect to the recruitment of patients, in particular as a result of the need for advance notice for patients. As a 'book on the day' or 'only a few days in advance' system had been adopted by all three practices, there were generally not many patients booked in a particular week. Patients were contacted in advance to give them time to think about participation, therefore restricting the ability to recruit patients.

There was also slow recruitment due to a number of other factors. An unreliable postal service meant that people did not always receive the letters in time. Many people were in a hurry to get to work and therefore unable to participate - especially in the mornings. Also a number of patients did not keep their medical appointments.

Those who agreed to participate did not always do so in fact for the following reasons: an interview was already taking place with someone else at the time and they chose not to wait; the patient had already had to wait a long time for their medical appointment and was therefore not inclined to participate afterwards; or, the patient forgot / changed their mind / listened to the project details and then changed their mind.

The gender of participants and people who refused to participate was recorded to allow investigation of biases that might be emerging in relation to various characteristics of the patients recruited. These data showed that refusals were 70% to 30% in favour of women (see table 3.2), with a slightly lower proportion of women in the participating population (63%).

There are several reasons why the sample had more women than men. First, women are more likely to have caring responsibilities (e.g. looking after children including health care). Many of the interviews took place in the morning and therefore the timing was more convenient, for example, for a female patient to bring her child along with her for her appointment. Second, some visits were related to pregnancy or post-pregnancy. Third, women are more likely to be in part time employment and therefore more able to visit the practice. Finally, women may be more likely to visit their GP when presented with symptoms than men. Women were also more likely to refuse to participate than males (see table 3.2).

The average recruitment rate was approximately four respondents per session. The set of patients who refused was collected and analysed to explore reasons for refusals.

***Table 3.1 Participation and non- participation***

<b>Practice</b>	<b>Participated</b>	<b>Refused</b>	<b>Non Participation for Other Reasons</b>
Brixton	130	16	12
Hetherington	132	40	15
Crowndale	44	24	4
<b>Total</b>	<b>306</b>	<b>80</b>	<b>31</b>

The last column included those who:

- Agreed, but left or did not attend appointment; agreed and arranged an appointment which they did not keep, or said they would participate but then left.
- Took away the questionnaire (see section 3.5) and did not return it.
- Were unable to conduct interview because of language barrier.

- Left messages, or were contacted but did not return the call.
- Said they would take part another time, but did not do so.
- Did not respond when names called out at reception.

A breakdown of the 80 patients who refused to participate by gender is shown in table 2.

Two patients refused to provide the information.

***Table 3.2 Gender of Refusals and Respondents***

	<b>M</b>	<b>F</b>
Refusals	23 (30%)	55(70%)
Respondents	112 (37%)	194 (63%)

There were different reasons why patients refused to participate. The most common was not having enough time on the day, with pressures of work, another appointment and childcare all being cited. A small number of patients did not feel well enough to do the interview and four patients were unhappy about the nature of the project

## **Professionals**

Semi-structured interviews were carried out with selected professionals in Lambeth whose roles are directly concerned with issues of equity (for more detail of the approach see Chapter 7). The sample was small and purposive, aiming to contribute a range of

perspectives from professionals immediately engaged with the target population. No attempt is made to generalise beyond those professionals interviewed.

Eight professionals undertaking a range of roles were actively sought for interview including a nurse, general practitioners (x3), primary care managers (x2) and public health professionals (x2) (see Chapter 7). The interviewees were identified through a narrow snowball technique: recruiting practitioners in the practices where patients were interviewed, and then obtaining introductions to other relevant public health professionals in Lambeth.

Interviews usually took place in the interviewee's work place, for example a GP surgery, primary care centres and in South Bank University. Interviews were recorded and transcripts made and analysed. The interviews lasted between 10 and 25 minutes.

### **3.3 Selection of variables**

#### **Benchmarks for socio economic position**

Chapter 2 provided an overview of the meaning of socio economic position, but more precise definitions are required if a method is to be devised to operationalise it in a GP practice setting. This section explains the reasons for selecting two benchmark measures, occupation and income, that are used for developing models to classify patients by socio economic position. A benchmark is defined here as a 'best' measure of socio economic position, a 'gold standard' measure – that is a point of reference to which something can be compared. In the models developed in later chapters, the benchmarks or combination of benchmarks will form the dependent variables in models to classify patients.

## Occupation

Hauser and Warren (1997) provide an overview of different occupational measures of socio economic position. They argue occupational measures are attractive to the researcher as they are relatively easy to obtain, have temporal stability and have strong associations with other socio economic variables.

Some occupational classifications, for example with the National Statistics Socio Economic Classification (NSSEC), are also able to capture occupational status, a dimension of socio economic characteristics that can be more difficult to measure, yet important for health outcomes. The work of Marmot et al (1991) found lower level occupations with less autonomy and status had mortality differentials of over three to one compared to the highest occupational status.

The most extensively used measure until the turn of this century has been the Registrar General's Social Class (RGSC). This has been used through most of the 20<sup>th</sup> century to discuss stratification and its link to a variety of health outcomes. In 1990 the RGSC was re-named as Social Class based on occupations – this measure was based primarily on the level of expertise in a job. That is, people were ranked by skill. So an analysis of the link between health outcomes and this measure was essentially measuring the link to the skill in occupations. The use of the RGSC and its variants clearly demonstrated a health gradient, with those in partly skilled and unskilled classes having higher mortality and lower life expectancy than those in professional and managerial occupations (see Black Report 1980 and Acheson Inquiry 1998).

However, many authors have identified problems with the RGSC on theoretical, conceptual and technical grounds (Pevalin and Rose 2001.) One of the main limitations of



the RGSC has been its rooting in an industrial economy that no longer exists in the UK – the hierarchical structure it claims to use was based on a social structure in the 19<sup>th</sup> century which no longer exists (Szreter 1984). Brewer (1986) also criticised the updated RGSC as lacking a conceptual explanation of the reformulation of the classification, in particular how occupational skills mapped on to earlier ideas of lifestyle and status.

The RGSC has also been criticized for masking large income variations within occupational groupings (Davey Smith, Shipley, Rose 1990). This can hide positions of certain social groupings within a social class. For example, members of certain ethnic minorities are more likely to be in lower grades and have lower income (see section on Ethnicity). This has been supported by the Fourth National Survey (1997) which showed ethnic minorities are more likely to have worse conditions and work longer hours than their white counterparts even in the same occupations.

In 1951, a new classification was devised, the Socio-Economic group (SEG) – this was an addition, not a replacement of the RGSC. The scheme included employment status and the size of the firm in its definition of social and economic status, but has been criticized as its 17 classifications could not easily be collapsed into larger categories, limiting its analytical usefulness.

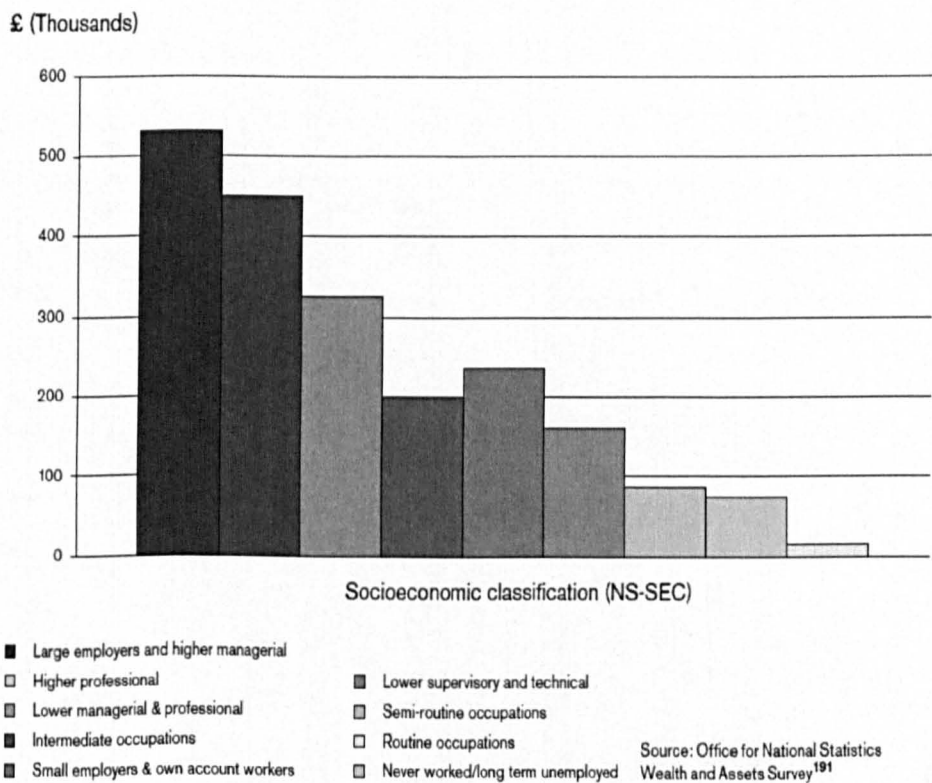
The NSSEC (National Statistics – Social Economic Classification) was used for the first time in the 2001 census. It was derived from the Erikson and Goldthorpe schema (1992). This is based around occupation and in particular around the nature of the employment contract. It distinguishes between the *service* contract and the *labour* contract. The former tends to be characterised by professional and managerial positions – such contracts involve less direct supervision, and the nature of the work usually assumes a degree of trust. Job security tends to be higher, a more progressive salary structure and career path more

permissible and people have more autonomy over their own work and/or control over others' work. In dual labour market theory this is the primary labour market.

Criterion for this study is the ability to rank individuals according to the level of control they

In contrast the people who have a labour contract tend to be more heavily supervised, have less autonomy and are generally paid by time and output, with career progression being more limited. This is the secondary labour market and mobility to the primary labour market is difficult. The NSSEC also captures wealth accumulation (Marmot 2010) as shown in Figure 3.1

**Figure 3.1 Median total wealth by socio economic classification (2006-2008)**



Source: Marmot (2010)

The NSSEC as measure of socio-economic position is however hard to operationalise due to the complexity of collecting the necessary information in a routine way. It requires a series of questions and then detailed coding.

The NSSEC has three main sets of analytical classifications. The choice of which to use should be determined by the research aims and also by the available data. A relevant criterion for this study is the ability to rank individuals, because of the aim of targeting patients in a low socio economic position. The 3 way analytical classification is the only hierarchical version of NSSEC. The collapsing of analytical classes from broader to narrower is shown below:

**Table 3.3 NS-SEC classifications**

8 classes	5 classes	*3 classes
1 Higher managerial and professional occupations	1 Managerial and professional occupations	1 Managerial and professional occupations
1.1 Large employers and higher managerial occupations		
1.2 Higher professional occupations		
2 Lower managerial and professional occupations		
3 Intermediate occupations	2 Intermediate occupations	2 Intermediate occupations
4 Small employers and own account workers	3 Small employers and own account workers	
5 Lower supervisory and technical occupations	4 Lower supervisory and technical occupations	3 Routine and manual occupations
6 Semi-routine occupations	5 Semi-routine and routine occupations	
7 Routine occupations		
8 Never worked and long-term unemployed		
	----- Excluded: Never worked and long-term unemployed	----- Excluded Never worked and long-term unemployed

Source Rose and Pevalin (2001)

That the NSSEC categories have strong links to health outcomes is well established (see Marmot 2010 for examples). Table 3.4 shows standardised mortality rates (SMRs) with clear health gradients between the three classifications.

**Table 3.4 Age-standardised mortality rates by three-class NSSEC for 2001–08, men aged 25–64 (England and Wales Rate per 100,000)**

NSSEC analytic class			
	Managerial and Professional	Intermediate	Routine and Manual
2001	232	328	466
2002	217	345	456
2003	215	327	457
2004	206	311	435
2005	199	302	422
2006	196	300	425
2007	190	289	412
2008	178	297	407

Source: National Statistics (2009) Statistical Bulletin

Table 3.5 shows odds ratios for different NSSECs and general health ratings and long term illnesses. There are higher odds ratios for lower classifications such as routine occupations and semi routine occupations suggesting that people in such occupations are more likely to have worse health and longstanding illness. The odds of those in routine occupations having poor health are over one and half times the odds of higher managerial and professional classifications having poor health. Those in NSSEC4 (small employers and own account workers) stand out however as not following the rank order as they also did in Figure 3.1 This is because the longer classifications are not hierarchical, since NSSEC4 is more heterogeneous and less well specified. Prevalin and Rose (1991) argue that collapsing into three categories by subsuming NSSEC4 into an intermediate category

overcomes this problem to a sufficient extent to make the 3 category classification hierarchical. It should be noted the sample population in this thesis is not restricted to the 18-59 age range as in the above study.

**Table 3.5 Logistic regression odds ratios of NSSEC inequalities in health for men and women aged 18-59: separating the long-term unemployed and never worked**

		General Health 'less than good'		Limiting Longstanding Illness (LLI)	
NS-SEC		Men	Women	Men	Women
1	Higher managerial and professional occupations				
1.1	Large employers and higher managerial occupations	0.53 ***	0.62 **	0.55 ***	0.45 **
1.2	Higher professional occupations	0.57 ***	0.66 *	0.56 ***	0.94
2	Lower managerial/professional occupations	0.72 ***	0.83	0.72 **	0.98
3	Intermediate occupations	1.00	1.00	1.00	1.00
4	Small employers and own account workers	0.95	0.96	0.94	0.95
5	Lower supervisory and technical occupations	1.16	1.59 ***	1.24	1.69 ***
6	Semi-routine occupations	1.39 ***	1.30 **	1.26	1.22 ***
7	Routine occupations	1.66 ***	1.68 ***	1.72 ***	1.59 ***
8	Never worked and long-term unemployed	2.09 ***	2.51 ***	2.94 ***	3.12 ***
	8.1 Long-term unemployed	2.07 ***	2.33 ***	2.43 ***	2.44 ***
	8.2 Never worked	2.32 ***	2.71 ***	11.92 ***	3.79 ***
N=		10481	12025	11892	12555
Reference category: intermediate occupations					
* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$					

Source: Rose (2009)

## Income

Income was selected as a second benchmark indicator since it is the most direct measure of material resources (Shaw et al 2007). It is not money per se that affects health outcomes, but the expenditure it enables to consume health promoting commodities and services, and income is therefore linked to living standards.

Income can be measured at the individual or household level. The latter measure allows for important composition effects of economies of scale of multi person households. This includes calculating the effects of caring for children and others on household standard of living and is evaluated through equivalisation scales.

In analysing associations between income and health, populations are often divided into deciles, and within the UK these are used as benchmarks for poverty lines. Income measures of this kind have added advantage over occupation based measures that can fail to classify those not in paid employment such as carers or the retired (Bartley 2004).

There has been extensive work on the links between income level and health (see Kawachi 2000). However, income is a complex variable (Krieger 1997) for several reasons. First, it can be derived from many sources, for example, wages/earnings, tax credits, state benefits, and interest payments. Further, irregular income such as contract work or self employment, or income gained from the hidden economy adds to difficulties in accurately estimating income level. It is also open to short term movements with individuals moving in and out of low income, so a single observation fails to capture the dynamic nature of income (Lynch and Kaplan 2000).

Shaw et al (2007) describe how income can be a sensitive issue, since there is a reluctance to provide accurate accounts of income. This sensitivity is often attached to an individual exposing their economic position, with a perception of a link between income level and social status. Over-estimation may occur when there is a reluctance to disclose a low income through a wish to be seen as having the higher status associated with higher income.

An additional concern is whether individual or household income should be used as the relevant variable. The latter includes the income of others who share the cost of living, e.g. paying bills, rent, food etc. Since many multi-person households share income, household income is often used, but this measure can hide the differences in the ways in which couples share income, and potentially more complex psychological factors about the control of how income is used (Pahl 1989, Burgoyne 1990)

Despite the difficulties of accurately obtaining income level, it was decided to use income as a second benchmark. The reasons are first, it is such a powerful indicator of material conditions; second it overcomes some of the limitations of occupation-based measures in classifying people who are not employed; and finally, there are strategies to overcome some of the practical information collection problems (described later in this chapter)

Both of these benchmarks were identified as being problematic for routine collection of data to classify patients. First, NSSEC would miss many patients due to non-classification, as well requiring detailed questioning and being complex to code and classify patients to socio economic classifications. Second, income posed problems for routine use, being information that is highly sensitive to disclose, leading to high levels of refusal and erroneous data.



For these reasons, a number of potential proxies, or indirect indicators, for the benchmarks were identified, which could be easily collected in a routine way.

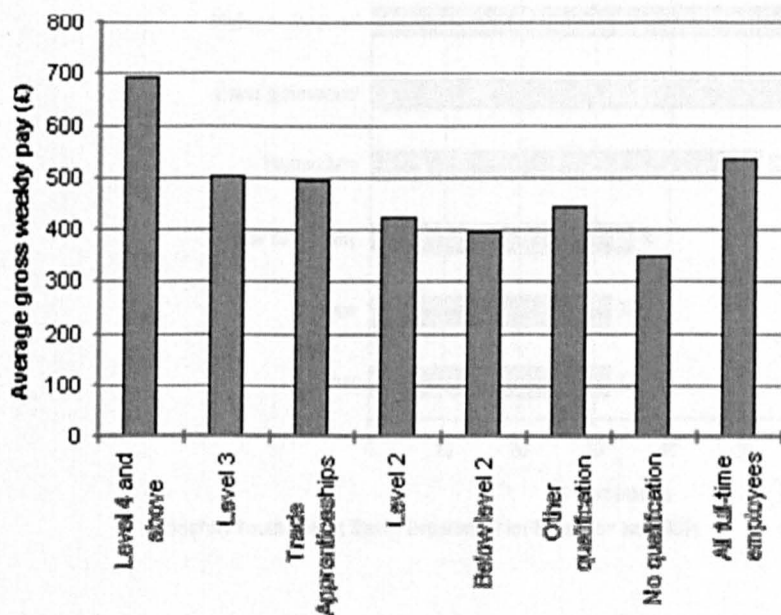
### **Proxies for socio economic position**

As explained above the limitations to the practical application of the two benchmarks require the use of alternative indicators to act as proxies for the benchmark. These will form the explanatory variables in the models developed in the following Chapters. These proxy indicators are not seen as 'gold standard' indicators of socio economic position, but have both theoretical and empirical associations to the benchmarks. For practical application they should also be linked to health outcomes themselves, allowing greater scope for practical use in primary care.

### **Education:**

Empirical support is strong for a link between education and future employment and income; it is therefore a useful indicator both on its own and also as a proxy for the two benchmark indicators (Lynch 2000). However, as Galabardes (2007) argues citing the work of Fuchs (1979) and Blane (2003), it also, independently has strong associations with health outcomes. Figure 3.2 shows earnings are positively associated with educational level attained.

**Figure 3.2 Average gross weekly pay of full-time employees by highest qualification gained, England, Quarter 2 2008**

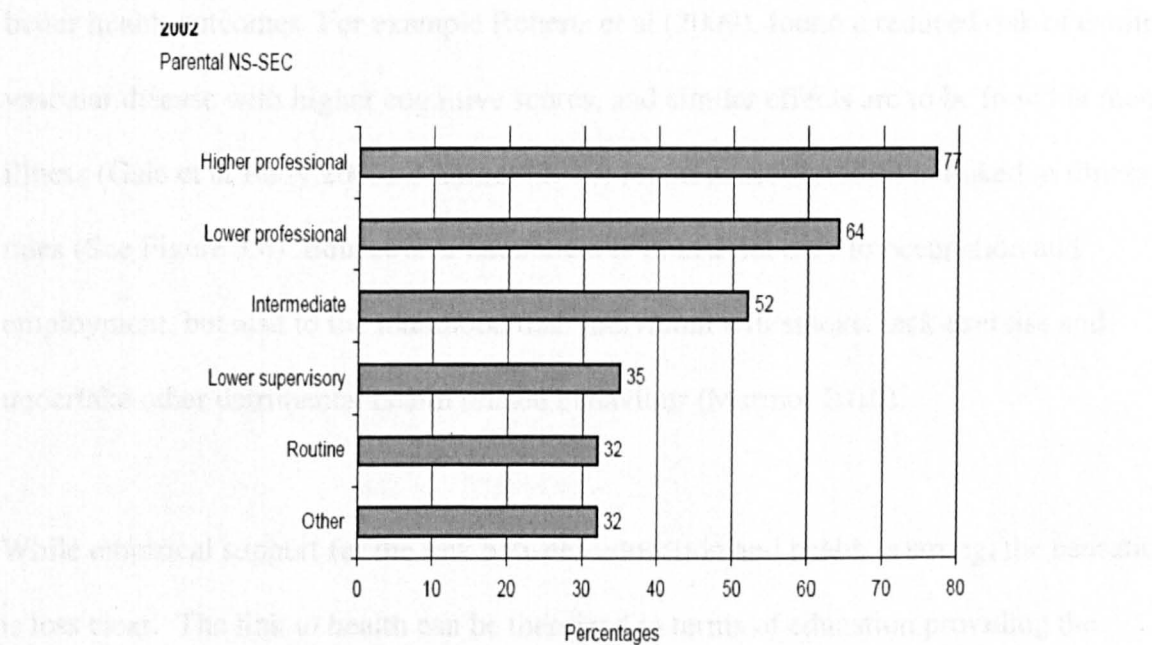


Note: Level 2 is equivalent to GCSE Grades A\*-C, Grade 3 is equivalent to GCE A'Levels, Grade 4 is equivalent to Certificates in Higher Education

Source: Department for children, schools and families (Chart C) (2009)

The link between education and socio economic position supports the Weberian theory of status, with the knowledge and assets that individuals possess, translating into future employment chances (Galabordes et al 1999). Furthermore, the link transcends stages in the life course, with early education and educational opportunities influencing status in later life (White 1999 et al, Morris 1996 et al). Figure 3.3 shows for example how parental socio economic classification is associated with children’s attainment

**Figure 3.3    Attainment of five or more GCSEs (A-C) by parental social class (2002)**



Source: Youth Cohort Study, Department for Education and Skills

Moreover, in line with Sen’s capabilities theory; the skills, confidence and cognitive developments attained through education can be seen to contribute to developing an individual’s capabilities and through this their functionings and socio economic position.

A key argument linking education to social and economic position is based on returns to human capital. Investing in education provides premiums in earnings returns over the life course through enabling people to secure better labour market positions in terms of conditions and pay (see figure 3.2). It is recognized however that non-educational factors such as ethnicity, gender and age for example can act as barriers in the labour market. In some cases these barriers can lead to situations in which higher qualifications do not necessarily translate into higher socio economic positions.

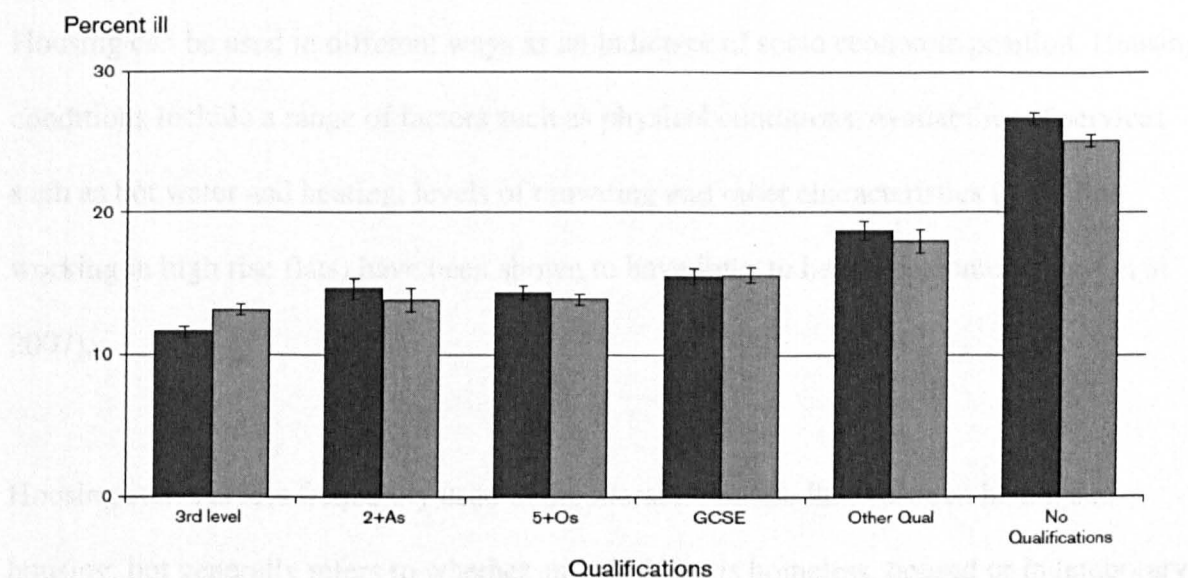
There have been many studies on the link between education and health outcomes (see Fuchs 1979, Winkleby et al 1992, Pincus and Callahan 1994).

International studies and work in the UK report that higher cognitive scores are linked to better health outcomes. For example Roberts et al (2009), found a reduced risk of cardiovascular disease with higher cognitive scores, and similar effects are to be found in mental illness (Gale et al Batty 2009). Marmot (2010) found education level is linked to illness rates (See Figure 3.4). Educational attainment is linked not only to occupation and employment, but also to the likelihood than individual will smoke, lack exercise and undertake other detrimental health related behaviour (Marmot 2010).

While empirical support for the link between education and health is strong, the causality is less clear. The link to health can be theorized in terms of education providing the knowledge to live healthier lives, and also the ability to secure better health services – education thus forms part of the capability set required for the potential functioning of good health.

Human capital derived from higher levels of education, also leads to material gains and higher status. These are both positively associated with improvements in health. Material gains through higher income and the benefits to health that arise from this are well documented (see Income section in this chapter). Higher levels of education are also likely to lead to higher levels of status and autonomy through a person's occupation. Marmot has identified a positive association between status and better health outcomes (Marmot 2004).

**Figure 3.4 Standardised limiting illness rates in 2001 at ages 16-74 by education level in 2001**



Source Marmot (2010)

The 1958 Birth Cohort study analysed by Power at al (1999) suggests that both education and social class are contributors to health outcomes, but that it is the latter that has far more importance, perhaps suggesting the impact of education on labour market chances is stronger than the ‘knowledge’ to be healthier argument in linking education and health.

Education as an indicator of socio economic position is therefore attractive for the reasons cited above, and data on education are relatively easy to collect, but there are some weaknesses. Meanings of educational level vary between cohorts over time with different age ranges having different educational opportunities. This is particularly the case for women and ethnic minority groups, and this can provide bias if not accounted for (Hadden 1996). There is an additional concern about standardisation of qualifications across different countries. In multi-cultural areas where significant proportions of the population have received their education in other countries, this can make comparisons difficult.

## Housing

Housing can be used in different ways as an indicator of socio economic position. Housing conditions include a range of factors such as physical conditions, availability of services such as hot water and heating, levels of crowding and other characteristics ( e.g. lifts working in high rise flats) have been shown to have links to health outcomes (Shaw et al 2007).

Housing status is less frequently used in the literature on the link between health and housing, but generally refers to whether an individual is homeless, housed or in temporary accommodation, for example staying with friends – a situation sometimes called ‘sofa surfing’ (Robinson and Coward 2003). While housing status defined in this way will undoubtedly affect health, it is hard to measure and define (Widdowfield 1999).

Housing tenure is a useful proxy for social and economic position, since home ownership is an important source for many people’s capital accumulation. It can thus be argued that housing tenure therefore reflects rather than determines socio economic position, making it a good proxy (McCarthy 2002).

Hills (2007), researching at an area level over 20 years, shows how more deprived areas have increasingly become areas with very high density of social housing. Social housing is usually defined as housing rented from a local authority or housing association, and Hill’s (2007) research found just under half of all social housing was located in the most deprived fifth of neighbourhoods.

Stafford and McCarthy (2006) argue however, that housing is an independent variable that stands alone as a health determinant, just like employment or income. The link between

housing and health is summarised by Shaw (2004) as covering a range of physical conditions and psychological factors such as levels of damp, cold, overcrowding (physical); and issues of insecurity, debt and neighbourhood features (psychological). The physical conditions affect health in areas such as respiratory illnesses, and the psychological effects work, through associations to status.

Shaw et al (1999) cite Wannamethee and Shaper’s (1997) study of 7000 British men, which showed that mortality differences by tenure are greater than those indicated by social class based on occupation. They suggest that this can be explained through the wealth effects of housing.

Most studies examining the link between housing and health have concentrated on the form of tenure. Standard mortality rates (SMRs) associated with housing tenure suggest home ownership improves health states, followed by private renting and then social (housing association and council housing). Table 3.6 below shows this effect.

**Table 3.6 Age odds ratios for death under 65 by housing tenure: England and Wales 1971 and 1981 Census Cohorts**

	Men		Women	
	1971-81	1981-89	1971-81	1981-89
Owners	1	1	1	1
Private renters	1.32	1.38	1.32	1.38
Local Authority renters	1.35	1.62	1.42	1.44

Source: adapted from Filakti and Fox (1995) in Shaw et al (1999)

These findings are also supported by numerous studies: Filakti and Fox (1995), Fox and Goldblatt (1982), Kogevinas (1990), Breeze, Sloggett and Fletcher (1999), Macintyre, Hiscock, Kearns and Ellaway (2000), Lewis et al (1998).

Lewis et al (1998) found neurotic disorders were around twice the prevalence among people renting than those owning property.

**Table 3.7 Odds Ratios for neurotic disorder by sex and housing tenure**

Housing Tenure	Men	Women
Own	1.0	1.0
Rent	2.17	1.71

Source: Lewis et al 1998.

Some studies have found that after controlling for economic and social circumstances the association between tenure and health outcomes is weakened (Moser, Pugh and Goldblatt 1988). Policies encouraging home ownership since the 1980s have shifted the pattern of home ownership by social class and in turn weakened the link between socio economic position and housing tenure. However, tenure nevertheless remains a good proxy for socio economic position.

**Affordability of heating**

In recognition of some of the limitations of housing tenure in explaining health outcomes, but acknowledging that housing conditions are important, an additional housing indicator is included in the study.



As stated above housing conditions have been widely studied, and as early as 1845 Engels stated

*“ We must admit that 350,000 working people in Manchester and its environs live, almost all of them, in wretched, damp, filthy cottages, that the streets which surround them are usually in the most miserable and filthy condition, laid out without the slightest reference to ventilation, with reference solely to the profit of the contractor”*

Aylin et al (2001) found higher winter mortality rates with a lack of central heating. The study also highlighted the complexity of separating other housing conditions and heating. Gemmell (2001) found that the level of heating and ability to insulate in housing were important determinants for health.

Curwen (1991) calculated that of total ‘excess winter deaths’, a third are attributable to respiratory disease, and over half to cardiovascular disease. Khaw & Woodhouse, (1995) and Collins et al (1985) argue that seasonal variations linked to warmth (or lack of warmth) are significant risk factors in these causes of death.

Affordability of heating has a second advantage as proxy besides the physical determinant of health argument. Households who struggle to heat their home may cut back on heating, but they may also borrow to pay for heating. This indicator then captures limitations of household income as well as the possibility of accumulation of debt.

### **Receipt of benefits**

The use of receipt of benefits as an indicator of socio economic position is founded on the link to low income and therefore the ability to consume. There is a range of benefits in the

UK including income support, jobseekers allowance, housing benefits, council tax benefit, and free school meals; along with a range of tax credits such as pension credit, child tax credit, disabled persons tax credit and others. Currently, child benefit is universal and unable to discriminate socio economic position, although the Conservative/Liberal Democrat government have announced that households with a 40% tax band payer will not be entitled to child benefit from 2013.

Advantages of using benefits as an indicator include good empirical data availability (Shaw et al 1997), as well as individuals being more likely to feel comfortable about disclosing benefits information than, say, information on income. There are those who are in low socio economic positions who do not claim benefits or are excluded from doing so though either because they do not qualify, or in some cases a perception of stigma of claiming. Benefits are also politically determined by the government setting the criteria for eligibility, therefore any association to socio economic position is that set by government social policy which may not use the same concept of deprivation or need as other definitions of low socio economic position or poverty.

## **Ethnicity**

Ethnicity is not a direct measure of socio economic position (Shaw et al 2007), but is often used as a proxy measure, particularly in the United States. Labour market data has consistently shown that ethnic background affects position in the labour market. The table below shows that some populations, for example those of Caribbean, Pakistani and Bangladeshi origin more likely to be found in lower social positions (by RGSC) than white, Indian or Chinese groups. The table also shows lower employment rates in all non-white ethnic groups apart from Chinese groups, and in terms of income Pakistani and

Bangladeshi groups are far more likely to be in the bottom tertile (90% of the Bangladeshi population being in the bottom tertile).

**Table 3.8 Socio economic position, employment rates and household income by ethnic group: Fourth National Survey of Ethnic Minorities**

	Caribbean (%)	Indian (%)	Pakistani (%)	Bangladeshi (%)	Chinese (%)	White Minority (%)	White English (%)
<b>Male employment rates, aged 16-65</b>	58	69	59	46	67	72	75
<b>Registrar General's class</b>							
<b>I/II</b>	24	34	23	12	40	46	35
<b>IIINM</b>	19	12	10	7	16	13	14
<b>IIIM</b>	28	29	40	39	34	25	32
<b>IV/V</b>	29	26	27	42	11	16	19
<b>Equivalent Household Income</b>							
<b>Bottom tertile</b>	47.8	45.1	68.8	89.6	41.3	26.8	30.9
<b>Middle tertile</b>	28	31	19.7	5.1	22.3	30.5	35.5
<b>Top tertile</b>	24.1	23.9	11.5	5.3	36.4	42.7	33.6

Source: Health Survey for England 1999 (see Erens et al. 2001),

There is, however, relatively little research into health differentials relating to ethnicity in the UK compared to the United States for example (Bartley 2004). Before the 1991 Census data collected was by country of birth, a much narrower and inadequate measure than

belonging to a minority ethnic group limiting the extent to which variations by ethnicity can be explored in meaningful ways.

Nazroo (1997) argues that broad categorical measures of ethnicity can hide important differences in health outcomes. For example, relative to the white population health outcomes were worse for Pakistani and Bangladeshi populations than for other populations. However, the importance of socio economic position as indicated by occupation was a key determinant within different populations; where manual occupations were more likely than higher occupations to have worse health outcomes.

When adjusted for socio economic position, many of the health differences were greatly reduced or disappeared (Nazroo 1997), indicating that it is the prevalence of many ethnic minority groups in lower socio economic positions that explains worse health outcomes. This is supported by Kaufmann et al (1997) who explain the complexity of untangling socio economic differences when interpreting variations in health by ethnic background. Such complexities can relate to different socio economic conditions, for example housing where South Asian families are more likely to own houses that are in worse condition or face overcrowding (Jones 1993).

Further, in some cases some minority ethnic groups can show lower mortality rates with similar levels of socio economic disadvantage as the population, for example African Caribbean men in the UK (Davey Smith et al 2000).

**Table 3.9 Standardised mortality rates by country of birth, men aged 20-64 years, England and Wales (1991-93)**

	All Causes	Ischaemic heart disease	Stroke	Lung cancer	Other cancer	Accidents and injuries	Suicide
Total	100	100	100	100	100	100	100
Caribbean	89*	60*	169*	59*	89	121	59*
West/South Africa	126*	83	315*	71	133*	75	59*
East Africa	123*	160*	113	37*	77	86	75*
Indian sub continent	107*	150*	163*	48*	65*	80*	73*
India	106*	140*	140*	43*	64*	97	109
Pakistan	102	163*	148*	45*	62*	68*	34*
Bangladesh	133*	184*	324*	92	74*	40*	27*
Scotland	129*	117*	111	146*	114*	177*	149*
Ireland	135*	121*	130*	157*	120*	189*	135*

Notes: \* $p < 0.05$ .

Source: Davey Smith et al 2000

Ethnic diversity in Lambeth, the area of this study, is wide and while the limitations of the indicator outlined above are recognised, ethnicity is included in this study to recognise that there may be particular effects in such an inner city area.

### 3.4 Collection of data

#### The questionnaire

The data for the quantitative analysis (see section 3.6) to classify patients was collected from an interview-based structured questionnaire. The design and implementation of the questionnaire had NHS Ethics Committee, approval and was piloted to test before use. The questionnaire was also used to collect both answers to closed questions and responses to more open ended comments by patients for subsequent qualitative analysis.

The full questionnaire is shown in Appendix 1

Question 6 – 13 followed the simplified interview version of collecting NSSEC following the Census methodology. The patients' occupations were coded, and then related to employment status through detailed follow up questions, notably concerning how much supervisory nature there is in the role. This provided an operational code which was then collapsed into three analytical classes (the only hierarchical classification – see table 3).

These classes are shown below:

1. Managerial and professional occupations
2. Intermediate occupations
3. Routine and manual occupations

The second benchmark was household equivalised disposable income (q14).

As discussed, one of the main problems with collecting data on this benchmark is the sensitivity around disclosing income. Bradburn and Sudman (1974) discuss the need for careful construction to minimise bias for sensitive questions, and several strategies were used in order to reduce this problem. These were addressed in different ways; first, the patient was assured of anonymity, so that no individual patient could be identified by name; second, the interview based nature of the questions can be expected to achieve higher response rates than self completed questionnaires; third, the question on income was located towards the end when a patient should feel comfortable having answered other questions; and finally, the banding of income allowed patients to approximate income rather than give exact incomes.

The question as designed asked patients to place their household income into a band of income (either weekly or monthly). This helps to overcome problems of lack of precise knowledge of income in the household, and secondly can be seen as being less intrusive than asking for a specific income. The mid income value was used for the calculation <sup>2</sup>.

Even when an interviewee is willing to disclose their income, collecting such data is still complex. When income is derived from employment, state benefits and pensions it is more straightforward to estimate, however the hidden economy, inter-family transfers, and irregular incomes (such as contract or self employment) may lead to underestimating income. Over-estimation may occur conversely when there is a reluctance to disclose a low income because of the perceived link between income and status explained earlier.

Since many multi-person households share income, the questionnaire asked about household income. This overcomes the problem of classifying someone who is not in paid employment, but has access to a large income through a partner, although it says nothing about how income is shared within a household.

Household composition also affects standard of living through the benefits of economies of scale of living with a partner, as well as the additional costs of having children. An additional question (q4) asked about the composition of the household – this is required to equivalise income using the Mc Clements scale (ONS 2010). The scales used are shown below:

Cohabiting head of household (0.61)      Partner/spouse (0.39)

1st additional adult (0.42) Subsequent adult (0.36)

---

<sup>2</sup> This was advised by statisticians at the Office of National Statistics as the best method to record values from a banded scale

Children aged: 16-18 (0.36) 13-15 (0.27) 11-12 (0.25) 8-10 (0.23)

5-7 (0.21) 2-4 (0.18) Under 2 (0.09)

Calculations were made using these scales to convert unequivalised income into equivalised income by dividing net income by the relevant scale. For example, a household with a cohabiting couple who have two children aged 8 and 11 with a net income of £25,000, would have an annual equivalised income of £16,892 ( $£25,000 / 1.48$ ). Annual income was estimated from the weekly or monthly figures given by patients.

Estimates of equivalised household income were established on the advice from the Office of National Statistics (ONS) by taking the median value of the band of equivalised income into which a patient's placed their household income. The banding was set by current ONS quintile boundaries for equivalised household disposable income.

Housing tenure, discussed above is included, for its association to wealth, income and health. A closed question (q1) identified housing tenure by owner occupier, private renter or social housing tenant. The recognition of the limitations of housing tenure as an indicator, particularly in an inner city environment, also led to the inclusion of a question on affordability of heating (q3). This question is a measure of housing conditions, as well as capturing constraints of income.

Education is included (q5) for the reasons explained in section 3.4. This thesis has adopted the WHO MMONICA project's first question on education, that is, the level of education. The three main reasons for this decision are that it is generally transferable across culture; it is easy to understand; and it displays empirical strength of links to the labour market and hence the NSSEC.



Receipt of benefits was included (q15, 16) as an important indicator of income and therefore the ability to buy goods and services.

Other questions included in the questionnaire were used to obtain further personal characteristics such as age, gender, ethnicity and religion (see Appendix 1)

### **Practitioners' questionnaire**

In order to obtain the perspectives of practitioners on the approach to equity analysed in this research a set of in-depth interviews was undertaken. The interviewees were all selected for their roles in primary health care in Lambeth. In particular, practitioners who worked in the GP practices where the patients in this study were registered, and other NHS primary care professionals who had working associations with these practitioners.

The full detailed analysis of these interviews is in Chapter 7, but the key questions are shown in Appendix 2.

## **3.5 Analytical approach – the method of analysis**

### **Quantitative analysis**

Having established a theoretical and empirical basis for two benchmarks and different explanatory variables, the quantitative analysis in this research examines the relationship between these different socioeconomic variables. The thesis first develops a method to classify patients, and then measures accuracy of classification, as well as developing

criteria for choosing between different benchmarks. These are considered in detail in Chapters 4, 5 and 8.

Initial exploration of the data uses cross tabulation, logistic regression and tests for confounding to identify a best fit model for predicting socio economic position (see Chapter 4).

The most common consideration when testing for specific models is the issue of predictive efficiency – the level of goodness of fit. However, in this case, the primary interest is less overall goodness of fit of the model, but rather one particular aspect of the model – the ability of the model to predict low socio economic position. The key focus in this research is the accuracy of classification with goodness of fit being used as a starting point to meet this aim. This uses Yerushalmy's (1947) definitions of sensitivity and specificity as the measures of diagnostic efficacy in measuring accuracy of classification (see Chapter 5 for detailed explanation)

The key challenge was to select the combination of proxies in a model that best predicts whether individuals are likely to be in a low socioeconomic position (say, NSSEC3).

The aim of identifying those patients at in a low socioeconomic position has to be considered alongside the more practical issue of limited resource available to target patients. The method must then identify a criterion to select the proxy/explanatory variables to use to identify them (see Chapter 8).

Chapter 5 models the association between these variables and the probability of being in NSSEC3, that is,  $p = P(\text{NSSEC3})$ , (the binary dependent variables will always take the form that 1 is low socio economic position and 0 is not in low socio economic position.)

A *linear* probability model is not used as it predicts probabilities outside the interval (0,1) and its error terms are not normal.

A logit model is used, which takes a non-linear transformation of the probability as the dependent variable. The dependent variable is the logit of the probability (that is, the log of the odds) that an individual is in the low socioeconomic position:

When the model is estimated the estimates of the coefficient of each variable are derived, and the estimate of the logit for each set of values of the explanatory variables can be obtained. From the estimated logit it is possible to derive the estimate of the probability  $\hat{p}$  of a patient belonging to a low socioeconomic position for each set of values of the explanatory variables associated with that model. This probability is then compared to one or more threshold values (cut off points) in order to predict which patients are at risk (positive) or not (negative). Chapter 5, Section 5.2 explains how this is the basis of an original method to identify a patient's socio economic position through using sensitivity and specificity analysis (briefly outlined below, and explored in detail in Chapter 5, Section 5.2)

The final models are presented as odds ratios, using logistic regression, where the odds of being in a low socio economic position of one group of patients is compared to the odds of a different group of patients being in a low socio economic position (see Chapters 4 and 5 for detail).

As is the convention in most relevant studies, a statistical significance level was set at a p value of 0.05, that is, in the particular set of data the probability that the null hypothesis is wrongly rejected is less than 0.05, or put differently, there is less than a 5% chance of rejecting the null hypothesis when it is, in fact, true. It is however recognised that finding

associations with significance below this level does not preclude drawing important conclusions from the data. Significance levels are cited throughout the findings.

To investigate the predictive efficiency of specific models a baseline model derived in Chapter 4 is compared to a best fit model defined by a backward stepwise logistic regression (see Chapter 5).

The extent to which explanatory variables (i.e. the proxies outlined earlier) lead to true positives and true negatives is a usual way of expressing the accuracy of a model in medical research (where the predictor matches the known outcome, the dependent variable). Yerushalmy's (1947) definitions of sensitivity and specificity are used for this diagnostic efficacy for measuring accuracy (see Chapter 5 for explanation). Chapter 5 provides a range of possible models to classify patients by socio economic position with tests for sensitivity and specificity using different probability cut-off points (see Chapter 5). The calculation of sensitivity and specificity were derived using the *lstat* command in the statistical package Stata that was used for all the quantitative analysis in this thesis. The development of this approach is original to this research, enabling flexibility in its use and application to a vertical equity approach to primary care.

## Qualitative analysis

The primary reason for using qualitative methods in the thesis is to obtain data that would not have been possible in the quantitative research design, but is essential for addressing the research question. In particular, there is a need to know what patients and practitioners believe and think about a vertical equity in healthcare that would be supported by collecting socio economic data at the time when patients register at a GP surgery.

Qualitative research methods have been summarised by Creswell (2003, p. 198-199)

*“It occurs in natural settings, where human behaviour and events occur; [and is] based on assumptions that are very different from quantitative designs. Theory or hypotheses are not established a priori; the researcher is the primary instrument in data collection; the data that emerge from a qualitative study are descriptive. That is, are reported in words (primarily the participant’s words) or pictures, rather than numbers; the focus is on participants’ perceptions and experiences... on the process that [is] occurring as well as the product or outcome”.*

In this research, qualitative data were collected in two ways. First, patients were invited by the interviewer to make any comments on their views on the approach undertaken. This open ended question came last in the questionnaire, and responses were noted and input later into Excel. Second, in-depth semi-structured interviews were undertaken with primary care professionals. A thematic approach to analysing the data was undertaken to analyse views on acceptability and equity. The coding from the fixed responses of patients allowed for categorising responses not only by the themes that emerged from the data, but also by different socio economic characteristics (e.g. socio economic position).

The qualitative analysis adopted involves searching for pattern, themes and holistic features of respondents' comments. Qualitative method can generate hypotheses as well as exploring them (Glassner and Moreno, 1989). Daly, Kellehear, and Gliksman, (1997) describe thematic analysis as the search for themes that emerge when analysing a phenomenon.

Boyatzis (1998) defines a theme as

*"A pattern in the information that at minimum describes and organises the possible observations and at maximum interprets aspects of the phenomenon"*

Face to face interview allows for clarification and probing where needed helping to overcome ambiguities. It further allows for greater depth and inconsistencies can be checked. Open-ended questions have the ability to evoke responses that are: meaningful and culturally salient to the participant, unanticipated by the researcher.

The method of analysis used both inductive and deductive processes. The inductive approach allowed themes and insights to emerge from patients' comments in open ended comments on the questionnaire, and open discussions with practitioners in an interview based structure. The deductive process is grounded in the theoretical framework established a priori with assumed thematic considerations.

Limitations of qualitative approaches are often constructed around problems with repeatability, or reliability. The basis of this concern is whether someone else, conducting the same qualitative research at a different time, could reveal something quite different.

This criticism, while acknowledged is outweighed by the benefits of a mixed methodological approach (see next section).

### **Combining methods for a mixed methodological approach**

Any individual method has its strength and limitations. Combining methods can use the strengths of individual methods and reduce their limitations. This, argues Tashakkori and Teddlie (1998), is likely to produce better research outcomes. For example, quantitative methods are limited in their ability to find motivations, attitudes and behavioural characteristics that lie behind fixed response answers within the questionnaire. However, based on large sample sizes, quantitative methods allow generalization of results (Scandura and Williams, 2000).

Mixed method approaches are essential in a study that both aims for statistical rigour to establish a model for measuring socio economic position, but also requires insight into the views and perceptions of both patients and practitioners. While the fixed responses described above allow for quantitative analysis, the open ended responses and semi structured interviews enabled qualitative analysis. Jones (2004) simply states a mixed methodology is one that has methods for comparisons between qualitative and quantitative findings.

Proponents of a mixed methodological approach often argue it allows for triangulation. Moebus (2002) describes triangulation as a process whereby two alternative methods are adopted to cross validate comparable data. Triangulation, therefore looks for a coming together of evidence whether from qualitative or quantitative data, to examine the extent to which different types of evidence produce similar conclusions. This argument can be used

for the inclusion of a mixed methodology, but it is not the only argument for its inclusion it here, since this research aims to find different, yet complementary findings from the two approaches.

Jick (1985) argued that data from different methods add to and complement each other, to provide a more complete picture, rather than providing cross validation. Barbour (2001), further argues, that the more relative approach of open ended responses and a lack of a singular superior outcome enables arguments about multiple interpretations in contrast to the singular validation through triangulation.

Qualitative analysis was used in this thesis mainly for complementary analysis (Richardson 1991), the two methods enabling fuller exploration of the data allowing for exceptions and different interpretations. The method undertaken is based primarily on a complementary approach to find such insights. A different justification of such mixed methods is one that is linked to pragmatism (Howe, 1988) where quantitative and qualitative methods are argued to be compatible.

Open ended comments complement the closed and fixed responses allowing far more depth to the meanings of the responses that by their nature fixed responses cannot. Open questions are more likely to allow the respondent to move outside the constraints set by the agenda of the researcher's closed questions (O'Cothain and Thomas 2004). They can thus act as a safety net to discover hidden issues and to allow for an exploration of the patient's own interpretation of acceptability and to allow the researcher to explore a qualitative analysis of their views. Such comments are important as it gives the interviewee the chance to use their own words and not be constrained by the simple acceptability scales in the closed questions.



Chapter 8 combines both methods to consider logistical and policy implications of the approach put forward in the research.

### **3.6 Bias**

While all attempts were made to reduce bias in the research design and process, the research outcomes of any investigation are open to a degree of bias. It is important to acknowledge this risk in reporting findings and where appropriate this is recorded in findings across Chapters 5-7. Where bias is extensive it can threaten both the validity and reliability of a piece of research (Bowling 2009). Delgado-Rodriguez and Llorca (2004) outline different types of bias and those mostly likely to exist in this thesis are outlined here.

First, a sampling bias may be present as patients were 'volunteers' having agreed to take part in the project knowing they would answer a questionnaire. It is therefore possible that the sample responses were not a true representation of the wider population with a possible bias towards positive responses on acceptability. Comparisons of the wider population of Lambeth with the sample, provided in Chapter 5, suggest good representation by socio economic composition. Nevertheless this comparison ignores more behavioural aspects of the sample.

Second, interview bias may also influence responses towards a positive response as compared to a self administered response. Bowling (1997) argues some of this inherent bias may be mitigated by the anonymity of the responses.

Third, non response bias can led to situations where the non-responders and responders have different characteristics. Attempts have been made to record reasons for non-response

and quantify non-response and commented on where relevant. This will be shown in Chapter 4.

Socio economic factors have different impacts across life courses. For example, in early years they may affect birth weight. During childhood, education and environmental factors influence attitudes to exercise and smoking. During adult years, occupation and income influence job stress and related illnesses (Lynch and Kaplan 2000). An additional issue recognised in the thesis is that the measurement of these factors through the benchmark and proxy indicators is conducted at a moment in time. The snapshot analysis of any indicator as a measurement of socio economic position beyond that moment in time may require additional measurements at a later date to take into account movements between across socio economic positions.

There are two different problems in the relationship between measurement and time. First, the benchmark indicators themselves have a temporal aspect. For example, a patient's household may temporarily have a higher or lower income than their 'typical' income, and this in turn will influence the accuracy of the measurement of that benchmark by the proxy indicators beyond the snapshot at that moment in time. Similarly, the occupation benchmark may indicate a temporary position due to unemployment or caring responsibilities for example.

The second problem is that the proxy indicators may themselves be time-specific, for example housing tenure or receipt of benefit, although others such as education are established early on in the life course.

### **3.7 Conclusion**

This Chapter has explained the methodology adopted to meet the needs of the research question. Justifications of a mixed methodology have been provided, using a combination of quantitative and qualitative methods.

The analysis was iterative: repeatedly revisiting both quantitative and qualitative findings and revising during the process of writing up. The presentation of analysis and findings in subsequent Chapters is the result of this iterative process

## **Chapter 4 Selection of benchmark and proxy variables**

### **4.1 Introduction**

Chapters 2 and 3 outlined the methodological and theoretical approach of this research. It established a mixed methodology using both quantitative and qualitative methods. Chapters 4 and 5 are primarily quantitative in nature, using data obtained from the questionnaire in Appendix 1.

This chapter investigates the benchmark and proxy variables (dependent and explanatory variables) discussed in Chapter 3. Chapter 5, Section 3.4 explained the aims of the proxy measures were as direct indicators of health status and/or as proxies for socio-economic position and hence indirectly as indicators of health status. It is primarily concerned with establishing a statistical basis for a series of models to classify socioeconomic position of patients. A comprehensive initial exploration of all variables uses cross tabulations, odds ratios and testing for confounding of the two benchmark variables NSSEC and Equivalised Disposable Household Income. This is followed by analysis of the proxies (explanatory variables), housing tenure, affordability of heating, education and receipt of benefits.

The analysis starts with a discussion of missing observations, an overview of the sample population, followed by an examination of the two benchmarks to be used as dependent variables. Finally, there is an analysis of the association of each of the proxies, that is the explanatory variables, with the benchmark (dependent) variables.

### **4.2 Missing observations**

Identifying the characteristics of the missing observations is important for the statistical validity of any model, in particular, whether the missing observations were likely to be significantly different from observed classifications. If missing observations were distributed between socio-economic position classifications in a significantly different pattern from the classified sample population then conclusions drawn from the model would be less strong in terms of both validity and reliability.

Missing observations arose for two main reasons, refusal to answer specific questions, as in the case of some responses to the income question, and non classification, for example older people not being classified by NSSEC.

Of the 306 responses, 179 could be classified according to the NSSEC. The main reasons for non-classification were people excluded because aged over 65, students, long term unemployed, and in a few cases insufficient information to classify. The exclusion of retired people can be overcome through assigning classification on last employment, but this was deemed to be insufficiently accurate as a measure of socio economic position. However, retired patients will be classified by the income benchmarks as well as other proxy variables (see below).

This 'missing' category formed a higher proportion of the sample population than of Lambeth's population as a whole, forming 41% of the sample compared to 24% in Lambeth's 2001 census (see Table 4.1). There are particular difficulties in estimating inner city population numbers, due to internal and international migration. In Lambeth internal migration tends to show a net outflow, while international migration has a net inflow. The ONS has identified more accurate measurement of migrants as a key priority for the 2011 census (ONS 2011).

**Table 4.1 National Socio Economic Classifications of sample and Lambeth**

NSSEC	% of Lambeth project	Census 2001 (Lambeth)
1	27	40
2	13	15
3	19	21
Missing	41	24

There were far fewer missing observations in the income classification, with just 4% not being recorded. The main reason for non-classification was refusal to answer the income question, an issue that is discussed in Chapter 6 in reference to levels and views on acceptability.

**Table 4.2. Equivalised household disposable income categories (including missing)**

Quintile	Number.	Percent
Top	87	29
2	37	12
3	65	21
4	42	14
Bottom	61	20
Missing	14	4
Total	306	100

The polarisation of household income reflects income inequalities in the borough. Lambeth combines a high proportion of people on low incomes (including a high proportion unemployed) with higher than national average incomes (NHS Lambeth 2009).

Cross tabulation of NSSEC and Equivalised Household Income is shown below (Table 4.3) including missing observations.

The missing NSSEC observations were as likely to be in the top income quintile (25%) as in the bottom quintile (23%). If we consider the bottom two quintiles, there was a slightly higher proportion in the bottom quintiles, due to greater numbers in the second bottom quintile than the second top.

Seven patients who were missing in NSSEC were also missing from Equivalised Household Income. The 14 missing observations from Equivalised Household Income were split three ways, three being NSSEC1, four being NSSEC3, and seven who were unclassified in NSSEC. The conclusion from the cross tabulation of missing observations from the two benchmark variables was that they were not particularly represented in high or low socioeconomic positions, albeit with some evidence that those with NSSEC missing may be more likely to be in a low socio economic position as measured by the bottom two income quintiles, than to be in the top two quintiles.

**Table 4.3. Cross tabulation NSSEC and Equivalised Household Disposable Income (% and count)**

NSSEC	Income						Total
	1	2	3	4	5	missing	
1	33	14	11	5	6	3	72
	45.83	19.44	15.28	6.94	8.33	4.17	100.00
	37.93	37.84	16.92	11.90	9.84	21.43	23.53
2	14	6	8	4	2	0	34
	41.18	17.65	23.53	11.76	5.88	0	100.00
	16.09	16.22	12.31	9.52	3.28	0	11.11
3	8	6	21	10	24	4	73
	10.96	8.22	28.77	13.70	32.88	5.48	100.00
	9.20	16.22	32.31	23.81	39.34	28.57	23.86
missing	32	11	25	23	29	7	127
	25.20	8.66	19.69	18.11	22.83	5.51	100.00
	36.78	29.73	38.46	54.76	47.54	50.00	41.50
Total	87	37	65	42	61	14	306
	28.43	12.09	21.24	13.73	19.93	4.58	100.00
	100.00	100.00	100.00	100.00	100.00	100.0	100.00

Pearson chi2(15) = 48.6667 Pr = 0.000

### 4.3 The benchmarks (dependent variables\)

In this section the benchmarks are used to identify low socio economic position in three ways. First, as outlined in Chapter 3, the NSSEC can collapse the full classification into three categories:

#### 1 Managerial and professional occupations



- 2 Intermediate occupations
- 3 Routine and manual occupations.

NSSEC3 (routine and manual occupations) is defined as low socio economic position.

Second, the income benchmark is used in two different ways to identify low socio economic position; patients who are in the bottom income quintile or in the bottom two income quintiles. These three benchmark measures are used as the basis for analysis of low socio economic position in this chapter.

Among patients who could be classified into an NSSEC, there was a polarisation between high and low classifications. While such polarisation also occurs within Lambeth's general population, there is a sharper polarisation in the sample population, mainly due to a higher percentage in NSSEC3 (see table 4.1)

**Table 4.4. Sample by NSSEC analytical classes**

Classification	N	Percentage
1	72	40
2	34	19
3	73	41
Total	179	100

There was a higher proportion of the sample that could be classified by the income benchmark (96%) compared to the NSSEC benchmark. The overall distribution of the sample by income shows a degree of polarisation in income, with higher proportions in the top (28%) and bottom quintiles (24%) compared to the middle income quintiles.

**Table 4.5 Distribution of sample by equivalised household income**

<b>Equivalised Household Income</b>	<b>Percent</b>
1	28
2	12
3	22
4	14
5	24
Total	100

In choosing to use two benchmarks, the question arises as to what extent are they statistically associated with each other – are people defined as being in low socio economic position by income also in a low socio economic position by their NSSEC? Understanding the strength of the association is important when making decisions about any practical application of the approach undertaken, but also is an indication of the validity of measurement of each measure. While, the two measures are conceptually different and would therefore not be expected to identify precisely the same group as being in a low socio economic position, it would be expected that NSSEC and Household Income would have a fairly strong positive statistical association, given the claims for them to be benchmark measures of socio economic position.

Exploration of the two benchmarks supported this expectation, showing reasonably close association between the two benchmarks. 75% of those in the bottom income quintile were classified as NSSEC3

However, a lower percentage of patients who were classified as NSSEC3 (41%) were in the bottom income quintile (35%) or bottom two quintiles (49%). This may partly be explained by NSSEC being an individual measure and income being a household measure

– where it is conceivable an individual with a low NSSEC may have a partner or other household members with higher incomes. It will also be because income levels of some occupations classified in NSSEC3 are above the bottom income quintiles. Finally, as discussed in Chapter 3, patients may over estimate income.

**Table 4.6 Cross tabulation of Equivalised Household Disposable Income and NSSEC (% and count)**

Income	NSSEC			Total
	1	2	3	
1	33	14	8	55
	60.00	25.45	14.55	100.00
	47.83	41.18	11.59	31.98
2	14	6	6	26
	53.85	23.08	23.08	100.00
	20.29	17.65	8.70	15.12
3	11	8	21	40
	27.50	20.00	52.50	100.00
	15.94	23.53	30.43	23.26
4	5	4	10	19
	26.32	21.05	52.63	100.00
	7.25	11.76	14.49	11.05
5	6	2	24	32
	18.75	6.25	75.00	100.00
	8.70	5.88	34.78	18.60
Total	69	34	69	172
	40.12	19.77	40.12	100.00
	100.00	100.00	100.00	100.00

Pearson chi2(8) = 39.6159 Pr = 0.000

Logistic regression techniques were used to analyse the association between dependent and explanatory variables, in this case the two benchmarks. This method, often used in epidemiological studies of health outcomes, measures the impact of one or more explanatory variables in predicting a binary outcome dependent variable. It models the association between binary outcomes and explanatory variables in terms of odds ratios.

This is particularly useful in this research, since the benchmark variables are being used to identify two possible outcomes: in a low socio economic position or not in a low socio economic position.

Odds ratios are used to present the findings where the odds of an event are calculated as the number (or probability) of events divided by the number (or probability) of non-events:  $p/(1-p)$ . The odds ratio is calculated by dividing the odds in the exposed group by the odds in the control group

Odds ratios can be derived from the coefficients in a logit regression, the logit being the natural logarithm of the odds ratio. The logit of a number  $p$  (the probability) and is expressed as a value between 0 and 1.

As explained in Chapter 3, when presenting the odds ratios the binary dependent variables will always take the form that 1 is in a low socio economic position and 0 is not in low socio economic position. So that for example:

NSSEC: 0 = NSSEC 1&2 1 = NSSEC3

Equivalised Income 0 = top four income quintiles 1 = bottom income quintile

Moreover, the binary explanatory variables used are always defined so that they take value 1 when the individual is most at risk of being classified as in a low socio economic position by the benchmark, and therefore more at risk of ill health due to the association between socio economic position and health states. The coefficients of the estimated model are thus always positive.

Logistic regression can analyse the association between ordered categorical explanatory variables with more than one level and a binary dependent variable. For example, NSSEC has three levels, income five quintiles, and the different explanatory variables have several levels. The logistic regression presents odds ratios for the explanatory variables comparing different groups (levels) within a particular variable. For example, for education, the baseline group is the highest education level to which other levels are compared, for housing, owner occupier is the baseline and is compared to renting and social housing. The results compare the odds of the non-baseline group to the baseline group (see tables 4.7-4.9)

Tables 4.7-4.9 show a strong association between the two benchmark variables with progressively higher odds ratio across income bands in relation to being NSSEC3, and increasing odds across NSSEC categories when regressing against the income benchmark.

Table 4.7 odds ratios show that the odds of a patient in the bottom income quintile being in NSSEC3 is almost 18 times the odds of someone in the top quintile (the baseline group) being in NSSEC3. This compares to odds ratios of 6.5 for a patient in the second bottom quintile and 1.8 for patients in the second top quintile.

While individual p values for second income quintile in Table 4.7, and NSSEC 2 in tables 4.8 and 4.9 show the relationship is not statistically significant. However the p value for the models overall were statistically significant.

**Table 4.7 Odds ratio household equivalised disposable income quintile and NSSEC3**

	Odds Ratio	Std. Err.	Z	P> z	[95% Conf. Interval]	
2nd Quin	1.7625	1.061814	0.94	0.347	.5411588	5.740286
3rd Quin	6.493421	3.224081	3.77	0.000	2.4538	17.18335
4th Quin	6.527778	3.90243	3.14	0.002	2.022557	21.06832
Bottom Quin	17.625	9.85966	5.13	0.000	5.887835	52.75973
Number of obs	=	172				
Prob > chi2	=	0.0000				

The regression of NSSEC against Income (bottom income quintile) shows the odds of patients who were classified as NSSEC3 were 5.6 times the odds of patients in the bottom income quintile being classified as NSSEC1. A regression of NSSEC against income (bottom two income quintiles) shows the odds of patients in NSSEC3 being in the bottom two income quintiles were 5.1 times the odds of patients who were classified as being NSSEC1 (see table 4.9).

**Table 4.8. Odds Ratio NSSEC and Household Equivalised Disposable Income (bottom quintile)**

NSSEC	Odds Ratio	chi2	P>chi2	[95% Conf.	Interval)
1	1.000000	.	.	.	.
2	0.656250	0.25	0.6176	0.124029	3.472299
3	5.600000	13.70	0.0002	2.000593	15.675351

Pr>chi2 = 0.0000

**Table 4.9 Odds Ratio NSSEC and Household Equivalised Disposable Income (bottom two quintiles)**

<b>NSSEC</b>	<b>Odds Ratio</b>	<b>chi2</b>	<b>P&gt;chi2</b>	<b>[95% Conf.</b>	<b>Interval]</b>
1	1.000000	.	.	.	.
2	1.129870	0.05	0.8273	0.376932	3.386837
3	5.122078	17.32	0.0000	2.172179	12.078045

*Pr>chi2* = 0.0000

From the above analysis several conclusions can be drawn in relation to the benchmark variables.

The two benchmarks have a reasonably strong statistical association to each other. There is sufficient strength of association – and also sufficient interesting and relevant difference between the two – to imply that both benchmarks should be explored further when building a model to identify socio economic position.

Missing observations in the two benchmarks appeared to have slightly different socio economic characteristics when observations were available for both the alternative benchmarks. In the case of NSSEC there was some tendency for missing observations to be patients in a lower socio economic position as measured by income. However, the observed sample still has 40% of patients classified as being NSSEC3, providing a good sample to test the ability of proxies to identify low socio economic position.

As explained in Chapter 3 to overcome the likelihood of missing observations (particularly in NSSEC) and the sensitivity of the income question several proxies for socioeconomic position were explored for their association to the benchmarks. They were also chosen for their links to health outcomes.

#### **4.4 Proxy variables (explanatory variables)**

This section examines the empirical strength of each of the proxy variables in turn in relation to each benchmark. The use of the term proxy variable in this research is as an explanatory variable that is measurable and that is an indicator or predictor for the benchmark variables. Depending on context, the terms proxy and explanatory variable are both used and can be treated as being synonymous.

The proxy variables have two main aims. First, they are included as a predictor a patient's socio economic position as measured by the benchmark indicators. In addition, a second aim is that the proxy variables should themselves be predictors of different health outcomes and can thus be used to target health interventions.

The analysis uses cross tabulation, odds ratios, logistic regression and the Mantel-Haenszel method to explore the possibility of confounding.

#### **Housing**

Housing tenure had a high response rate (96%) from the questionnaire. The sample population is shown in table 4.12 along with Lambeth as a whole. As can be seen the sample population was comparable to Lambeth, which has lower owner occupier rates (37.2%) than the UK average of just under 70% (Office for National Statistics). Owner occupier and private renter definitions are comparable. The definition for the social housing category for Lambeth includes shared ownership with the Council, housing association tenancy and renting directly from the Council.



**Table 4.10 Housing Tenure of sample population and Lambeth as a whole**

<b>Housing Tenure</b>	<b>N</b>	<b>Sample(%)</b>	<b>Lambeth(%)</b>
Social Housing	113	38.6	42.5
Private Renting	77	26.3	18.4
Owner occupied	103	35.1	37.2
Total	293	100	100

Source: Census 2001

The data showed a reasonably strong association between NSSEC and housing tenure for social housing and owner occupier classifications, but a weaker association with private renting.

Cross tabulation shown below shows that 62.5% of patients living in social housing were NSSEC3. Owner occupiers were more likely to be in NSSEC 1 (58%) than patients renting privately or in social housing. Private renting was less useful as a housing indicator of NSSEC with 42% being in NSSEC1 and 35.5% being in NSSEC3. This is likely to be explained by the diversity of private rental accommodation in an urban environment such as inner London, with rental accommodation being sought by high earners as well as low income households.

**Table 4.11 Cross tabulation of Housing Tenure and NSSEC (% and count)**

Housing	NSSEC			Total
	1	2	3	
Owning	40	14	15	69
	57.97	20.29	21.74	100.00
	55.56	43.75	22.73	40.59
Private rent	19	10	16	45
	42.22	22.22	35.56	100.00
	26.39	31.25	24.24	26.47
Social Housing	13	8	35	56
	23.21	14.29	62.50	100.00
	18.06	25.00	53.03	32.94
Total	72	32	66	170
	42.35	18.82	38.82	100.00
	100.00	100.00	100.00	100.00

Pearson chi2(4) = 23.1819 Pr = 0.000

There were 123 patients who could not be classified by NSSEC who could be classified by housing tenure, with 28% owning, 26% private renting and 46% living in social housing. This suggests that patients who could not be classified by NSSEC were more likely to live in social housing than those with NSSEC classification.

Table 4.12 shows the odds ratios for housing tenure. It shows that the odds of patients in social housing being classified as NSSEC3 are six times the odds of patients who were owner occupiers being in NSSEC3. The odds for private renters were almost twice the odds of owner occupiers being classified as NSSEC3, although this variable's P value is not significant at the 5% confidence level. Social housing provides a much stronger indicator of socio economic position, since 69% of patients not in social housing were in NSSEC1&2 and 62.5% of patients in social housing were in NSSEC3.

**Table 4.12. Odds ratios of Housing Tenure and NSSEC3**

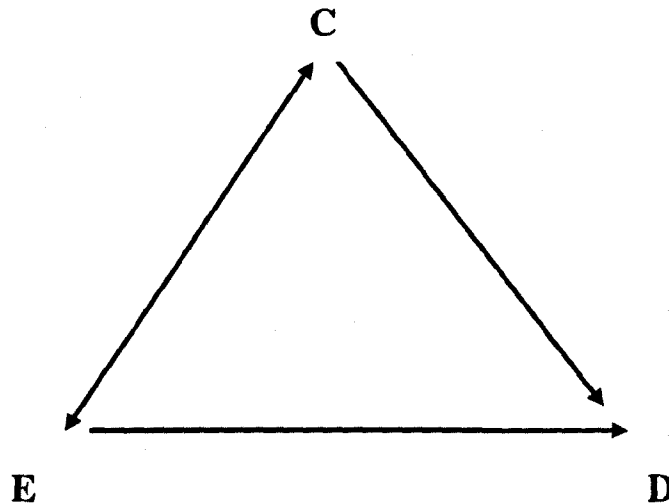
	Odds Ratio	chi2	P>chi2	[95% Conf. Interval]	
<b>Housing Tenure</b>					
Owner Occupiers	1.000000	.	.	.	.
Private Renting	1.986207	2.60	0.1067	0.848869	4.647379
Social Housing	6.000000	21.23	0.0000	2.517908	14.297581

Pr>chi2 = 0.0000

The above analysis led to the conclusion that social housing should be included in a final model to identify patients who are in a low socio economic position. A final analysis using Mantel-Haenszel method was undertaken to explore the possibility for confounding between explanatory variables.

Confounding occurs when the association between an explanatory variable (E in Figure 1) and a dependent variable (D) is distorted or confounded by the effect of a third variable C that is both an explanatory variable to the dependent variable as well as associated with the other explanatory variable ( see diagram below).

**Table 4.13 – Confounding**



In this example whether there is confounding between social housing (E in figure 1) and other explanatory variables of the benchmark (for example education C). Confounding is thus a systematic rather than a random error and therefore hypothesis testing should not be used.

A Mantel-Haenszel summary test compares odds ratios for a chosen variable through controlling the effects of different variables, producing a second odds ratio. The larger the difference, the more confounding there may be between the variables. A judgement based on understanding the relationship between variables is needed to interpret any test results, rather than any simple clear cut rule on levels of confounding, but is based on whether the results change the interpretation of the data.

Controlling for low education (primary/secondary education) and being in receipt of income benefit, the relationship between social housing and NSSEC is examined using Mantel-Haenszel Analysis.

**Table 4.14. Mantel-Haenszel test for social housing controlling for low education and income benefit.**

	Odds Ratio	chi2 (1)	P>chi2	[95% Conf. Interval]	
Social Housing	3.728070	15.83	0.0001	1.858591	7.477979
Control Low Ed	2.955337	8.95	0.0028	1.402596	6.227037
Control Inc benefit	3.124901	11.53	0.0007	1.561518	6.253535

The Mantel-Haenszel test controlling for low education suggested small confounding effects with odds ratio being 2.955 when controlling for low education as opposed to 3.73. When controlling for receipt of income benefit the odds ratio had a smaller change (3.12). The conclusion from these tests was that confounding was not a major factor.

In relation to the income benchmark an identical analysis was undertaken to analyse the association between housing tenure and the income benchmarks. The findings (see Table 4.15) provide similar results to those measuring NSSEC, although the associations are slightly weaker. 53% of patients in social housing were in the bottom two income quintiles, increasing to 78% in the bottom three quintiles. 59% of owner occupiers were in the top two income quintiles, with 15% of owner occupiers being in the bottom two quintiles. A higher proportion of private renters (43%) were in the top income quintile than owner occupiers (38%), with 31% of private renters being in the bottom two quintiles. This suggests again that private renting is not a reliable indicator of low socio economic position. 21% of patients living in social housing were in the top two income quintiles,

showing that taken on its own social housing would classify these patients as being on a low income when in fact they were in the top two income quintiles.

**Table 4.15. Cross tabulation of housing tenure and equivalised household disposable income (% and count)**

		Income Band					
Housing Tenure		1	2	3	4	5	Total
-----+-----							
Owning		37	21	25	10	5	98
		37.76	21.43	25.51	10.20	5.10	100.00
		43.02	60.00	38.46	24.39	9.26	34.88
-----+-----							
Private		32	7	13	8	15	75
Renting		42.67	9.33	17.33	10.67	20.00	100.00
		37.21	20.00	20.00	19.51	27.78	26.69
-----+-----							
Social		17	7	27	23	34	108
Housing		15.74	6.48	25.00	21.30	31.48	100.00
		19.77	20.00	41.54	56.10	62.96	38.43
-----+-----							
Total		86	35	65	41	54	281
		30.60	12.46	23.13	14.59	19.22	100.00
		100.00	100.00	100.00	100.00	100.00	100.00

Pearson chi2(8) = 48.5580 Pr = 0.000

There were only 12 patients who did not have an income classification, with 42% of patients owning and living in social housing and 16% privately renting.

Further investigation used logistic regression to find odds ratios for housing tenure. It found the odds of patients living in social housing being in the bottom income quintile

were over eight times the odds of owner occupiers being in the bottom income quintile (Table 4.16). The odds of private renters being in the bottom income quintile were over 4 times the odds of owner occupiers being in the bottom income quintile.. The odds of patients in social housing being in the bottom two income quintiles were 6 times the odds of owner occupiers being in the bottom two quintiles. Private renters had odds double the odds of owner occupiers being in the bottom two income quintiles.

**Table 4.16. Odds ratios of housing tenure and bottom quintile of equivalised household disposable income**

Housing Tenure	Odds Ratio	chi2	P>chi2	[95% Conf. Interval]	
Owning	1.000000	.	.	.	.
Private rent	4.650000	9.17	0.0025	1.554721	13.907638
Social Housing	8.545946	23.18	0.0000	2.988268	24.439975

Pr>chi2 = 0.0000

**Table 4.17. Odds ratios of housing tenure and bottom two quintiles of equivalised household disposable income**

Housing Tenure	Odds Ratio	chi2	P>chi2	[95% Conf. Interval]	
Owning	1.000000	.	.	.	.
Private Rent	2.447436	5.81	0.0159	1.153741	5.191757
Social Housing	6.184314	31.58	0.0000	2.988865	12.796075

Pr>chi2 = 0.0000

Additional exploration of private renting was undertaken, measuring its association with patients in the bottom quintile and patients in the bottom two income quintiles. In both

cases private renting was not strongly associated with being in a low socio economic position, rather these positions displayed similar associations between private renting and not private renting. For example, in relation to the bottom income quintile, 79% of non-private renters were not in the bottom income quintile and 80% of private renters were not in the bottom income quintile. Similarly, 21% of non-private-renters were in the bottom income quintile and 20% of private renters were in the bottom income quintile.

The conclusion as it stands from the above analysis was that social housing should be included in a final model to identify low socio economic position, but private renters should be excluded due to inconsistency as an explanatory variable, given the apparent diversity of socio economic characteristics of private renters in an inner city area such as Lambeth.

Controlling for low education (primary/secondary education) and being in receipt of income benefit, the relationship between social housing and household income is examined using Mantel-Haenszel analysis.

In each case there were small confounding effects, but not large enough to cast doubt on using social housing in any model to measure socio economic position.



**Table 4.18. Mantel-Haenszel test for social housing controlling for low education and income benefit with bottom quintile of equivalised household disposable income**

	Odds Ratio	chi2(1)	P>chi2	[95% Conf. Interval]	
Social housing	2.671672	11.59	0.0007	1.482882	4.813483
Contr Low Ed	2.042377	6.86	0.0088	1.183351	3.524992
Contr inc ben	1.816942	3.44	0.0637	0.957523	3.447729

**Table 4.19. Mantel-Haenszel test for social housing controlling for low education and income benefit with bottom two quintiles of equivalised household disposable income**

	Odds Ratio	chi2(1)	P>chi2	[95% Conf. Interval]	
Social housing	3.352941	22.92	0.0000	1.981359	5.673990
Contr low ed	2.694812	15.20	0.0001	1.603704	4.528276
Contr In ben	2.614336	12.86	0.0003	1.514726	4.512206

The conclusion from the statistical analysis of housing tenure as a proxy for both NSSEC and equivalised household disposable income is that social housing is a good proxy for low socioeconomic position. Owner occupation is more likely to signify higher socio economic position, but private renting is an inconsistent indicator. As the primary purpose of this thesis is to identify low socio economic position, only social housing should be used in models to classify patients (see Chapter 5).

## Heating

The affordability of heating question had a high response rate with 98% of patients responding. Of the 301 patients, nearly three quarters said they did not have a problem in affording heating of their home ( see table 4.20)

Table 4.20. Affordability of heating

Heating	N	Percent
0	214	71.1
1	87	28.9
Total	301	100

key    0 = not difficult to meet the costs of heating    1 = difficult to meet the costs of heating

Cross tabulation analysis of problems in affording heating did not show a clear association with NSSEC3. Approximately 50% of patients who said they had problems affording adequate heating were classified NSSEC3 and 50% not NSSEC3.

Table 4.21 Cross tabulation affordability of heating and NSSEC (% and count)

heating	NSSEC			Total
	1	2	3	
0	62	22	47	131
	47.33	16.79	35.88	100.00
	86.11	64.71	67.14	74.43
1	10	12	23	45
	22.22	26.67	51.11	100.00
	13.89	35.29	32.86	25.57
Total	72	34	70	176
	40.91	19.32	39.77	100.00
	100.00	100.00	100.00	100.00

Pearson chi2(2) = 8.8049    Pr = 0.012

key    0 = not difficult to meet the costs of heating

1 = difficult to meet the costs of heating

Calculation of the odds ratio for heating as an explanatory variable show the odds of patients who have problems affording heating being classified as NSSEC3 are around double the odds of patients who do not have problems affording adequate heating being

NSSEC3. However, the p value is higher than 5%, and this suggests caution is needed in drawing firm conclusions from the association.

**Table 4.22. Odds ratios of affordability of heating and NSSEC3**

Heating	Odds Ratio	chi2	P>chi2	[95% Conf. Interval]	
0	1.000000	.	.	.	.
1	1.868472	3.23	0.0725	0.934111	3.737443
Pr>chi2	= 0.0000				

key 0 = not difficult to meet the costs of heating

1 = difficult to meet the costs of heating

Similar investigation against the income benchmark showed 34% of those who cite heating as being an issue were in the bottom income quintile, and 59% of those patients fell into the bottom two quintiles. This suggests affordability of heating is a better indicator of the income benchmark than of the NSSEC benchmark.

**Table 4.23. Cross tabulation affordability of heating and equivalised household disposable income**

heating	income band					Total
	1	2	3	4	5	
0	74	34	44	20	30	202
	36.63	16.83	21.78	9.90	14.85	100.00
	85.06	91.89	69.84	47.62	50.85	70.14
1	13	3	19	22	29	86
	15.12	3.49	22.09	25.58	33.72	100.00
	14.94	8.11	30.16	52.38	49.15	29.86
Total	87	37	63	42	59	288
	30.21	12.85	21.88	14.58	20.49	100.00
	100.00	100.00	100.00	100.00	100.00	100.00

Pearson chi2(4) = 38.2607 Pr = 0.000

key 0 = not difficult to meet the costs of heating

The logistic regressions show the odds of patients who say they have problems with affordability of heating being in the bottom income quintile were approximately three times the odds of patients who stated they did not have problems affording heating being in the bottom income quintile. In relation to the bottom two income quintiles, the odds of patients who say they have problems with affordability of heating being in the bottom two income quintiles were four and a half times the odds of patients who say they do not have problems heating their homes. The analysis provides some evidence that affordability of heating may be a useful proxy for the income benchmark, but less so for the NSSEC benchmark.

**Table 4.24. Odds ratios of affordability of heating and equivalised household disposable income**

heating	Odds Ratio	chi2	P>chi2	[95% Conf. Interval]	
Bottom income quintile					
0	1.000000	.	.	.	.
1	2.916959	13.14	0.0003	1.589859	5.351827
Bottom two income quintiles					
0	1.000000	.	.	.	.
1	4.429714	31.51	0.0000	2.507703	7.82483
Pr>chi2 = 0.0000					

key 0 = not difficult to meet the costs of heating

1 = difficult to meet the costs of heating

Controlling for social housing, low education (primary/secondary education) and being in receipt of income benefit, the relationship between heating and household income was examined using Mantel-Haenszel Analysis.

There was little evidence of confounding by the key explanatory variables with the bottom income quintile, and only small negative confounding with the bottom two income quintiles.

**Table 4.25. Mantel-Haenszel test for heating controlling for social housing, low education and income benefit with equivalised household disposable income (bottom income quintiles)**

	Odds Ratio	chi2(1)	P>chi2	[95% Conf. Interval]	
Heating	2.916959	13.14	0.0003	1.589859	5.351827
con soc hous	2.377652	8.29	0.0040	1.294113	4.368420
con lowed	2.479349	8.89	0.0029	1.337063	4.597518
con inc ben	2.481115	8.18	0.0042	1.302442	4.726453

**Table 4.26. Mantel-Haenszel test for heating controlling for social housing, low education and income benefit with bottom two quintiles of equivalised household disposable income.**

	Odds Ratio	chi2(1)	P>chi2	[95% Conf. Interval]	
Heating	4.429714	31.51	0.0000	2.507703	7.824836
Con soc hous	3.527193	22.77	0.0000	2.029452	6.130268
Con lowed	3.721812	24.40	0.0000	2.126306	6.514527
Con inc ben	4.094406	26.15	0.0000	2.278542	7.357407

Affordability of heating appears to be a better indicator of low socio position as measured by the income benchmarks than by NSSEC, and is explored further in the models in Chapter 5.

## Ethnicity

In the 2001 Lambeth census 50% of the population were not white British, 31% of whom were not born in the UK. Over 150 languages are spoken, with Yoruba and Portuguese being the most common after English. However, the registration of National Insurance Numbers has shown a marked increase since 2002 suggesting the migrant population of Lambeth is growing.

Analysis of ethnicity using the NHS ethnicity classifications led to the conclusion that in this sample, declared ethnicity did not appear to be statistically significant as indicating a patient to be at risk according to the two benchmarks.

For example, the three categories of ethnicity that had the highest proportions of the population were White British, Black British and Black Caribbean. Of these patients there were 35% of the White British in NSSEC3, compared to 36% of the Black British and 25% of the Black Caribbean.

For the income benchmark, for the same ethnic backgrounds, there were slightly higher proportions of patients from Black British category (33%) in the bottom income quintile compared to 23% of those from White British backgrounds, 23% Black Caribbean. The Black African category had 29% in the bottom income.

The analysis examined all the individual ethnic group classifications as well as grouping ethnicity into broader categories such as Asian/British Asian, Black/Black British, White, Mixed background and other. These broader categories also led to no evidence that ethnicity was a statistically significant indicator of low socio economic position in this sample. One possible reason for this finding is that the large number of NHS categories of ethnicity, along with small numbers in individual categories, mean that individual ethnic group variations may not be evident in such a small sample. Aggregating individual

classifications is problematic as it assumes homogeneity of social and economic characteristics between groups.

**Education**

Education level had a high response rate from patients, with 98% answering the education question. Of the 300 patients, 39% stated they had the highest education level, with 29% just having secondary and 5% primary level (see table 4.27)

*Table 4.27. Education Level*

Education level	N	Percent
university	117	39.00
secondary to university	63	21.00
secondary	87	29.00
primary	16	5.33
other	17	5.67
Total	300	100.00

Cross tabulation of education level and NSSEC is shown in Table 4.28. The most significant feature is the strong association between low education level and NSSEC3, with 67% of patients with secondary level education being classified as NSSEC3 and 86% of patients with primary level education. There is a clear hierarchy, with higher education levels being associated with higher NSSEC classifications. The association between very low education as defined by just primary level and NSSEC3 is very strong with 86% of

patients with very low education being classified as NSSEC3. The 'other' classification has only five observations, although it should be noted that four of the five observations were NSSEC3 with the other being NSSEC1. In addition, the 'other' category is not hierarchical as it may capture levels of qualification that are not easily mapped and is subsequently dropped as an explanatory variable in later analysis. While primary education is hierarchical classification with only seven observations it is excluded as separate variable in later analysis (the secondary education variable will also capture patients with primary education only). Of the 123 missing NSSECs, a similar spread was evident, with a slightly lower proportion of patients having university or above level of education (34%), and slightly higher proportion (31%) having secondary level and 7% primary level.



**Table 4.28. Cross tabulation Education level and NSSEC (% and count)**

education	NSSEC			Total
	1	2	3	
1	48	14	14	76
	63.16	18.42	18.42	100.00
	66.67	42.42	19.44	42.94
2	13	12	15	40
	32.50	30.00	37.50	100.00
	18.06	36.36	20.83	22.60
3	10	6	33	49
	20.41	12.24	67.35	100.00
	13.89	18.18	45.83	27.68
4	0	1	6	7
	0.00	14.29	85.71	100.00
	0.00	3.03	8.33	3.95
5	1	0	4	5
	20.00	0.00	80.00	100.00
	1.39	0.00	5.56	2.82
Total	72	33	72	177
	40.68	18.64	40.68	100.00
	100.00	100.00	100.00	100.00

Pearson  $\chi^2(8) = 46.5827$  Pr = 0.000

**Key**

- 1 Degree and above
- 2 Further education
- 3 Secondary
- 4 Primary
- 5 Other

Calculation of odds ratios reinforced the view that having primary and secondary education only may be good indicators of low socio economic position. The odds of a patient with secondary education level being classified as NSSEC3 is nine times the odds of a patient with degree or above degree level education. The odds of a patient with primary level education being NSSEC3 is 27 times the odds of a patient with degree level. The odds of the 'other' classification with just five observations were 17 times the odds of degree or above level to be NSSEC3. Qualitative evidence of the 'other' category showed difficulties in accurately measuring education level and it was decided to focus on primary and secondary level education level.

**Table 4.29. Odds ratios of education level and NSSEC3**

education	Odds Ratio	chi2	P>chi2	[95% Conf. Interval]	
1	1.000000	.	.	.	.
2	2.657143	5.04	0.0247	1.094236	6.452363
3	9.133929	30.15	0.0000	3.495072	23.870365
4	26.571429	15.68	0.0001	2.280279	309.629099
5	17.714286	10.17	0.0014	1.542069	203.490136

Pr>chi2 = 0.0000

**Key**

- 1 Degree and above
- 2 Further education
- 3 Secondary
- 4 Primary
- 5 Other

Controlling for social housing and being in receipt of income benefit, the relationship between social education level and NSSEC is examined using Mantel-Haenszel Analysis.

**Table 4.30. Mantel-Haenszel test for low education controlling for social housing and income benefit with NSSEC3**

	Odds Ratio	chi2 (1)	P>chi2	[95% Conf. Interval]	
Low education	6.005190	27.95	0.0000	2.816314	12.804789
Contr soc housing	5.137089	21.38	0.0000	2.369747	11.136078
Contr inc benefit	4.646364	24.23	0.0000	2.369113	9.112566

There is evidence of some confounding between income benefit and low education, but the difference was not deemed to be large enough to exclude the possibility of using low education as a proxy variable for low socio economic position.

Analysis of education level and equivalised household disposable income was carried out in the same way.

Cross tabulation shown below of education and income level showed 36% of patients with primary or secondary education level were in the bottom income quintile, 51% of patients with secondary or primary level education were in the bottom two income quintiles. If measured against the bottom three quintiles this increased to 76%. This suggests that low education may be useful, but not a strong indicator of being classified as having low equivalised household disposable income. There were relatively few (15) missing income observations and of these they were spread fairly evenly across education levels.

**Table 4.31. Cross tabulation of education level and equivalised household disposable income (% and count)**

education	income band					Total
	1	2	3	4	5	
1	51	22	19	10	12	114
	44.74	19.30	16.67	8.77	10.53	100.00
	60.00	59.46	29.69	25.00	19.67	39.72
2	18	6	14	9	13	60
	30.00	10.00	23.33	15.00	21.67	100.00
	21.18	16.22	21.88	22.50	21.31	20.91
3	14	8	21	13	27	83
	16.87	9.64	25.30	15.66	32.53	100.00
	16.47	21.62	32.81	32.50	44.26	28.92
4	1	0	3	6	4	14
	7.14	0.00	21.43	42.86	28.57	100.00
	1.18	0.00	4.69	15.00	6.56	4.88
5	1	1	7	2	5	16
	6.25	6.25	43.75	12.50	31.25	100.00
	1.18	2.70	10.94	5.00	8.20	5.57
Total	85	37	64	40	61	287
	29.62	12.89	22.30	13.94	21.25	100.00
	100.00	100.00	100.00	100.00	100.00	100.00

Pearson  $\chi^2(16) = 54.1207$  Pr = 0.000

**Key**

- 1 Degree and above
- 2 Further education
- 3 Secondary
- 4 Primary
- 5 Other

The odds ratios showed that the odds of patients with secondary education level being classified as in the bottom or bottom two income quintiles were around four times the odds of someone with degree level education. Primary education level had lower odds ratios when tested against bottom income quintile than secondary education, but this was not significant at the 0.05 level. Against the bottom two income quintiles, the odds of patients with primary level education were ten and a half times the odds of patients with university level education.

**Table 4.32 Odds ratio education level and bottom income quintile**

education	Odds Ratio	chi2	P>chi [95% Conf.Interval]		
1	1.000000	.	.	.	.
2	2.351064	3.94	0.0471	0.985207	5.610495
3	4.098214	14.57	0.0001	1.867803	8.992043
4	3.400000	3.68	0.0550	0.899886	12.846079
5	3.863636	5.26	0.0218	1.112537	13.417693

Pr>chi2 = 0.0004

**Table 4.33 Odds Ratio education level and bottom two income quintiles**

education	Odds Ratio	chi2	P>chi2 [95% Conf. Interval]		
1	1.000000	.	.	.	.
2	2.421053	6.24	0.0125	1.182533	4.956730
3	3.890063	18.50	0.0000	1.995091	7.584915
4	10.454545	17.93	0.0000	2.700940	40.466473
5	3.252525	4.80	0.0284	1.064431	9.938569

Pr>chi2 = 0.0000

Controlling for social housing and being in receipt of income benefit, the relationship between low education (and very low education) and household income (bottom two income quintiles) is examined using Mantel-Haenszel Analysis.

These are summarised in the table below.

**Table 4.34 Mantel-Haenszel test for low education controlling for social housing and income benefit with equivalised household disposable income.**

	Odds Ratio	chi2(1)	P>chi2	[95% Conf. Interval]	
(bottom quintile)					
Low education	2.583333	10.73	0.0011	1.432852	4.657572
Con soc hous	1.942496	5.90	0.0152	1.125503	3.352537
Con inc ben	2.020182	5.37	0.0204	1.101153	3.706238
(bottom two quintiles)					
Low education	2.850261	16.79	0.0000	1.687353	4.814635
Con soc hous	2.162162	8.89	0.0029	1.285912	3.635510
Con inc ben	2.465527	11.16	0.0008	1.425978	4.262913
(bottom income quintile)					
Very Low Ed	1.550877	0.52	0.4695	0.467742	5.142189
Con soc hous	1.174467	0.08	0.7803	0.379015	3.639360
Con inc ben	1.241796	0.15	0.6993	0.412974	3.734028
(bottom two income quintiles)					
Very low Ed	4.973118	8.39	0.0038	1.489605	16.602995
Con soc hous	3.076923	5.35	0.0208	1.127879	8.394038
Con inc ben	4.035128	7.64	0.0057	1.381934	11.782225

An examination of the table above shows a small degree of confounding, particularly with social housing and very low education against the bottom two income quintiles.

# Benefits

Exploration of the data led to two variables relating to benefits being investigated in more depth: receipt of any of the benefits and more specifically receipt of income support.

Table 4.35. Cross tabulation of receipt of benefits and NSSEC classification (% and count)

benefits	NSSEC			Total
	1	2	3	
0	63	29	42	134
	47.01	21.64	31.34	100.00
	87.50	85.29	57.53	74.86
1	9	5	31	45
	20.00	11.11	68.89	100.00
	12.50	14.71	42.47	25.14
Total	72	34	73	179
	40.22	18.99	40.78	100.00
	100.00	100.00	100.00	100.00

Pearson chi2(2) = 19.7232 Pr = 0.000

Being in receipt of an<sup>3</sup>y benefit showed a strong association with being classified as NSSEC3 with 69% of patients in receipt of a benefit being classified as NSSEC3.

Further analysis of odds ratios, show the odds of patients claiming benefits being classified as NSSEC3 as being almost five times the odds of patients not being in receipt of any benefit.

<sup>3</sup> Any benefit is defined a patient stating they are in receipt of any State benefit including but not exclusively the benefits listed

**Table 4.36. Odds ratio of receipt of benefits and NSSEC3**

benefits	Odds Ratio	chi2	P>chi2	[95% Conf. Interval]	
0	1.000000	.	.	.	.
1	4.850340	19.55	0.0000	2.234785	10.527095
Pr>chi2	=	0.0000			

**Key**

- 0 Not in receipt of any benefit
- 1 Receipt of benefit

Controlling for social housing, low education (primary/secondary education) and heating, the relationship between receipt of benefit and NSSEC is examined using Mantel-Haenszel Analysis.

This showed a small degree of negative confounding particularly with low education, but this was deemed as being insignificant.

**Table 4.37. Mantel-Haenszel test for receipt of benefit controlling for social housing, low education and affordability of heating with NSSEC.**

	Odds Ratio	chi2 (1)	P>chi2	[95% Conf. Interval]	
Benefit	4.850340	19.55	0.0000	2.234785	10.527095
Con soc hous	3.936326	13.56	0.0002	1.790608	8.653296
Con low educ	3.828506	14.12	0.0002	1.801155	8.137814
Con heating	4.775272	19.27	0.0000	2.208002	10.327536

Being in receipt of a benefit was also strongly associated with the income benchmark.



**Table 4.38. Cross tabulation receipt of benefit and equivalised household disposable income(% and count)**

benefits	Income band					Total
	1	2	3	4	5	
0	82	34	42	23	25	206
	39.81	16.50	20.39	11.17	12.14	100.00
	94.25	91.89	64.62	54.76	40.98	70.55
1	5	3	23	19	36	86
	5.81	3.49	26.74	22.09	41.86	100.00
	5.75	8.11	35.38	45.24	59.02	29.45
Total	87	37	65	42	61	292
	29.79	12.67	22.26	14.38	20.89	100.00
	100.00	100.00	100.00	100.00	100.00	100.00

Pearson chi2(4) = 63.4399 Pr = 0.000

**Key**

- 0 Not in receipt of any benefit
- 1 Receipt of benefit

A small proportion of patients who are not in receipt of benefits were in the lowest income quintile (12%), with 42% of patients who are in receipt of any benefit being in the lowest quintile, 58% not being in the lowest quintile. This might suggest that benefits are effective at identifying those not in lower income quintiles, but less so at identifying lower income.

However, as would be expected benefits are more likely to be effective in identifying the broader category of the bottom two quintiles: 64% of patients in receipt of any benefit are in the bottom two income quintiles.

The odds ratios for being in receipt of benefit and being in lower income quintiles show the odds of patients in receipt of benefit being in the lower income quintile are just over five times the odds of patients not being in receipt of benefit. The odds of being in the bottom two income quintiles were almost six times the odds of patients not being in receipt of benefits.

**Table 4.39. Odds ratios of being in receipt of benefit and equivalised household income**

	Odds Ratio	chi2 (1)	P>chi2	[95% Conf. Interval]	
Bot inc quintile	5.212800	32.33	0.0000	2.759474	9.847270
Bot two inc quintiles	5.840054	43.77	0.0000	3.226423	10.570910
Pr>chi2	= 0.0000				

Controlling for social housing, low education (primary/secondary education) and heating, the relationship between receipt of benefit and household income (bottom and bottom two income quintiles) is examined using Mantel-Haenszel Analysis. Tests for confounding were undertaken and are shown below.

**Table 4.40. Mantel-Haenszel test for benefits controlling for social housing, low education and heating with equivalised income (bottom quintile)**

	Odds Ratio	chi2 (1)	P>chi2	[95% Conf. Interval]	
<b>Benefits</b>	5.212800	32.33	0.0000	2.759474	9.847270
Con soc hous	4.483188	22.23	0.0000	2.262362	8.884067
Con Low ed	4.545367	27.15	0.0000	2.431784	8.495970
Con heating	4.039101	24.65	0.0000	2.223387	7.337605

**Table 4.41 Mantel-Haenszel test for benefits controlling for social housing, low education and heating with equivalised income (bottom two quintiles)**

	Odds Ratio	chi2 (1)	P>chi2	[95% Conf. Interval]	
<b>Benefits</b>	5.840054	43.77	0.0000	3.226423	10.570910
Con soc hous	4.504728	29.06	0.0000	2.471435	8.210849
Con low ed	5.072724	37.70	0.0000	2.848115	9.034936
Con heating	4.459403	32.09	0.0000	2.529977	7.860260

The Mantel Haenszel tests suggest little confounding between variables.

### **Income benefit**

A cross tabulation for income benefit with NSSEC showed 81% of patients in receipt of income benefit were classified as NSSEC3. Of the patients who were not in receipt of income benefit, 35.44% were in NS-SEC3. A patient who stated they received income support was classified as receiving income benefit.

**Table 4.42. Cross tabulation of income benefit with NSSEC classification(% and count)**

income benefit	NSSEC			Total
	1	2	3	
0	69	33	56	158
	43.67	20.89	35.44	100.00
	95.83	97.06	76.71	88.27
1	3	1	17	21
	14.29	4.76	80.95	100.00
	4.17	2.94	23.29	11.73
Total	72	34	73	179
	40.22	18.99	40.78	100.00
	100.00	100.00	100.00	100.00

Pearson chi2(2) = 15.9300 Pr = 0.000

Key

0 Not in receipt of income benefit

1 Receipt of income benefit

The odds ratios for income benefit as an explanatory variable for NSSEC show the odds of a patient in receipt of income benefit being classified as NSSEC3 is eight times the odds of a patient who is not in receipt of income benefit.

**Table 4.43 Odds Ratios of income benefit and NSSEC3**

Income benefit	Odds Ratio	chi2	P>chi2	[95% Conf. Interval]	
0	1.000000	.	.	.	.
1	7.741071	15.81	0.0001	2.344709	25.557196

Key

0 Not in receipt of income benefit

1 Receipt of income benefit

Test for confounding with the other key variables showed a degree of confounding, in particular with low education as an explanatory variable. This finding will be considered when modelling in Chapter 5.

**Table 4.44. Mantel-Haenszel test for income benefit controlling for social housing and low education with NSSEC3(% and count)**

	Odds Ratio	chi2(1)	P>chi2	[95% Conf. Interval]	
Income Benefit	7.741071	15.81	0.0001	2.344709	25.557196
Con soc hous	5.105375	11.16	0.0008	1.758305	14.823853
Con low ed	3.876588	11.51	0.0007	1.666939	9.015285

As it would be expected there is a strong association between receipt of income benefit and equivalised household disposable income given it is mean tested.

**Table 4.45. Cross tabulation income benefit with equivalised household disposable income(% and count)**

income benefit	income band					Total
	1	2	3	4	5	
0	87	36	57	36	37	253
	34.39	14.23	22.53	14.23	14.62	100.00
	100.00	97.30	87.69	85.71	60.66	86.64
1	0	1	8	6	24	39
	0.00	2.56	20.51	15.38	61.54	100.00
	0.00	2.70	12.31	14.29	39.34	13.36
Total	87	37	65	42	61	292
	29.79	12.67	22.26	14.38	20.89	100.00
	100.00	100.00	100.00	100.00	100.00	100.00

Pearson chi2(4) = 52.7337 Pr = 0.000

Key: 0 = Not in receipt of income benefit 1 = Receipt of income benefit

61% of patients who are in receipt of income benefit are in the bottom income quintile and 77% of patients who are in receipt of income benefit are in the bottom two income

quintiles. There was a relatively low proportion of false negatives, with 14% of patients who are not in receipt of income support being in the bottom quintile, and the same percentage being in the second lowest quintile.

The odds ratios of income benefit as an explanatory variable for both the bottom quintile and bottom two quintiles are shown below. The odds of patients in receipt of income support benefit being classified as being in the lowest income quintile are nine times odds of patients who are not in receipt of income benefit being in the bottom income quintile. This decreases to eight times for the bottom two income quintiles.

**Table 4.46. Odds Ratios of income support and equivalised household disposable income**

Income benefit	Odds Ratio	chi2	P>chi2	[95% Conf. Interval]	
(bottom income quintile)					
0	1.000000	.	.	.	.
1	9.340541	44.85	0.0000	4.202417	20.76084
Pr>chi2	=	0.0000			
(bottom two income quintiles)					
0	1.000000	.	.	.	.
1	8.219178	34.08	0.0000	3.529184	19.141789
Pr>chi2	=	0.0000			

Key

- 0 Not in receipt of income benefit
- 1 Receipt of income benefit

Controlling for social housing and low education, the relationship between income benefit and household income (bottom two income quintiles) is examined using Mantel-Haenszel

Analysis. These tests showed greater degrees of confounding with low education in relation to the bottom income quintile and social housing in relation to the bottom two income quintiles.

Table 4.47. Mantel-Haenszel test for confounding for income benefit and equivalised household disposable income

	Odds Ratio	chi2(1)	P>chi2	[95% Conf. Interval]	
(bottom income quintile)					
Income benefit	9.340541	44.85	0.0000	4.202417	20.760840
Cont soc hous	7.807899	32.43	0.0000	3.375602	18.059980
Cont low ed	7.267201	36.64	0.0000	3.423446	15.426622
(bottom two income quintiles)					
Income benefit	8.219178	34.08	0.0000	3.529184	19.141789
Cont soc hous	5.897704	22.55	0.0000	2.565583	13.557508
Cont low ed	6.984980	27.56	0.0000	2.998999	16.268742

## Conclusion

From earlier chapters and the exploration of the variables in this chapter, both NSSEC and Equivalised Household Disposable Income were selected as benchmarks for socio economic position. They are both robust measures of socio economic position, and have reasonably strong associations with each other. However, they are unable to be used directly on a routine basis to measure socio economic position in a GP practice for the following reasons:

- 1) The NSSEC leads to problems of non classification: not only are certain groups excluded from classification ( e.g. students), but also the complexity of collecting

and classifying patients would be problematic in a GP setting, leading to large numbers of unclassified .

- 2) Income is likely in practice to lead to refusal by patients to complete information ( see Chapter 7), and so produce erroneous data or non-classification in a significant number of cases.

Because of the problems in collecting information on the benchmark measures of socio economic position, proxy variables are required to identify the benchmarks. These proxies form the explanatory variables be used in developing models to classify patients by socio economic position. Housing tenure (social housing), education level, receipt of benefits (in particular Income benefit) and affordability of heating (see table 4.47 for detail) were all identified to be included in the modelling exercise.

Other variables such as age, gender and ethnicity are not included in subsequent models. Age was problematic due to being unable to classify older patients to NSSEC, while gender and ethnicity appeared not to be associated with socio economic position in this sample.



***Table 4.48. Explanatory variables selected as proxies to measure low socio economic position***

Social Housing	Renting from housing association or local authority
Low Education	Having only primary or secondary level education
Receipt of any benefit	Being in receipt of any benefit
Receipt of income benefit	Being in receipt of income benefit (income support)
Affordability of Heating	Having difficulty in affording to heat home adequately

The analysis in this chapter also concludes that social housing, low education and receipt of income benefit have particular strength in their associations with the benchmarks, but that different explanatory variables are associated in different ways with the two benchmarks.

These three variables will form a baseline model in Chapter 5 to classify patients into low socio economic position. In addition, models combining all the explanatory variables will also be explored to maximise accuracy in predicting socio economic position (see Chapter 5).

## **Chapter 5 Classifying patients by low socio economic position**

### **5.1 Introduction**

This chapter provides a method for classifying patients into low socio economic position. It will measure the accuracy of different specific models. Chapter 4 established a statistical basis for including two dependent variables, NSSEC and equivalised household disposable income and five explanatory variables.

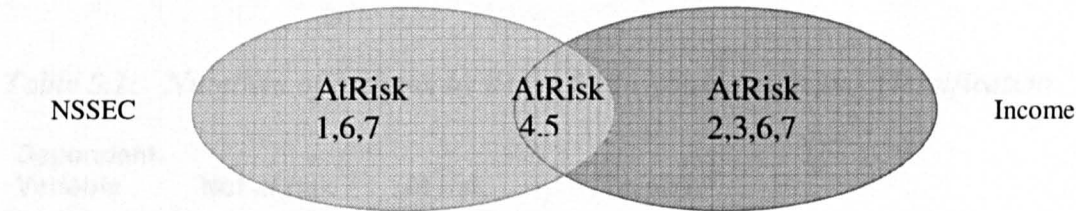
To allow for greater flexibility of analysis, as well as more scope for selecting patients for possible medical interventions, the two benchmarks are used to identify seven different classifications of low socio economic position. These are shown in Figure 5.1 below and will be the dependent variables in the models developed in this Chapter.

These classifications are labelled as 'at risk'. Classifications atrisk 1,2&3 are specific to one benchmark, e.g. atrisk1 is a patient classified as NSSEC3. Atrisk4&5 arise when a patient is both NSSEC3 and in a low income quintile (either bottom or bottom two).

AtRisk 6&7 are defined as when a patient is classified as either being in NSSEC3 or either the bottom or two bottom income quintiles.

Figure 5.1 Defining Low Socio Economic position : dependent variables

These variables are defined by the different combinations of the two benchmarks. Throughout this chapter and the thesis individual patients are always defined as being in a low socio economic position (atrisk) with respect to one of the classifications above (dependent variables). These are shown in Table 5.1 and provide different observed populations with varying proportions identified as being atrisk. The narrowest classifications are the dependent variables where patients are classified as being at risk when they are identified by both benchmarks, for example atrisk 4 with 14% of 172 patients being classified as low socio economic position and atrisk 5 with 20% of 172



atrisk1	Lowest NSSEC (=3)
atrisk2	Lowest quintile of equivalised household income
atrisk3	Bottom two quintiles of equivalised household income
atrisk4	Lowest NSSEC and bottom quintile of equivalised household income
atrisk5	Lowest NSSEC and bottom two quintiles of equivalised household income
atrisk6	Lowest NSSEC <b>OR</b> bottom quintile of equivalised household income
atrisk7	Lowest NSSEC <b>OR</b> bottom two quintiles of equivalised household income

The dependent variables are defined by the different combinations of the two benchmarks. Throughout this chapter and the thesis individual patients are always defined as being in a low socio economic position (atrisk) with respect to one of the classifications above (dependent variables). These are shown in Table 5.1 and provide different observed populations with varying proportions identified as being atrisk. The narrowest classifications are the dependent variables where patients are classified as being at risk when they are identified by both benchmarks, for example atrisk 4 with 14% of 172 patients being classified as low socio economic position and atrisk 5 with 20% of 172

patients being classified as low socio economic position. The broadest classifications are those where patients are identified as being low socio economic position if they are either in NSSEC3 or a in low income quintile with 37% of 299 patients being classified as low socio economic position by atrisk 6 and 47% by atrisk 7.

**Table 5.1: Numbers of patients by dependent variable as at risk classification**

<b>Dependent Variable</b>	<b>Not at risk</b>	<b>At risk</b>	<b>Total (n)</b>
Atrisk1	106(59%)	73(41%)	179
Atrisk2	231(79%)	61(21%)	292
Atrisk3	189(65%)	103(35%)	292
Atrisk4	148(86%)	24(14%)	171
Atrisk5	138(80%)	34(20%)	172
Atrisk6	189(63%)	110(37%)	299
Atrisk7	157(53%)	142(47%)	299

The method provides a framework for a fuller exploration of the diagnostic efficiency of explanatory variables to identify low SEP, as well as wider choice of measures of socio economic position. The differences between NSSEC and Equivalised Household Income enables a distinct choice between an occupation based measure and an income based measure which in turn have different strengths as measures of low SEP (see Chapter 3). Also, by specifying different individual and combinations of the two measures, it enables more flexibility in statistical analysis through different populations of at risk classifications ( see table 5.2). The method provides not only a choice of dependent variables and accompanying specific models, but also a range of possible accuracy thresholds within the models.

Explanatory variables identified in Chapter 3 were analysed for their statistical association with the two dependent variables, as well as being independently tested for confounding

using the Mantel Haenszel test. The conclusion from the last chapter identified the following explanatory variables to be included in the specific models in this chapter;

**Table 5.2 Explanatory variables**

<b>Social Housing</b> defined by living in housing association or public sector accommodation (council housing)
<b>Low Education</b> defined by education levels of not above secondary
<b>Receipt of income benefit</b> defined by receipt of income benefit.
<b>Receipt of any benefit</b> defined by being in receipt of any benefit
<b>Affordability of heating</b> defined as having difficulty affording heating

Chapter 4 concluded that *social housing, low education and receipt of income benefit* should be included as a baseline model to classify patients ( see next section for the regression equation)

## **5.2 Goodness of fit and accuracy**

In this thesis, the main aim of the models is their ability to accurately predict low socio economic position, that is, one segment of the model. As discussed in Chapter 3, there is a difference between goodness of fit and accuracy in classification. Menard (2002) explains that goodness of fit is not synonymous with accuracy of classification. It is possible that a model that has a good level of fit can have poor accuracy in classifying a specific target outcome, in this case low SEP. Goodness of fit is thus used in this chapter as a starting point for exploring accuracy of classification, not as the ultimate aim of a specific model.

A logistic regression approach was chosen, with the dependent variable's binary outcome identified as a patient either in a low SEP, or not in a low SEP – so that a patient is in a low

SEP (=1) or a patient who is not in a low SEP (=0) as defined by the dependent variables shown in table 5.1.

For each model, the results are presented as both coefficients and odds ratios (see Chapter 4 for explanation).

From the model, estimates of the coefficient for each of the variables can be obtained. These estimates of the coefficients are then used to calculate the estimate of the logit for each set of values of the explanatory variables (that is, for each individual) using the formula:

$$\log it(\hat{p}) = \log\left(\frac{\hat{p}}{1-\hat{p}}\right) = \hat{\alpha} + \hat{\beta}_1 \times X_1 + \hat{\beta}_2 \times X_2 + \dots + \hat{\beta}_k \times X_k$$

where the hats indicate the estimates.

From this expression, the predicted probability  $\hat{p}$  can be derived for the various combinations of values of the explanatory variables. If the odds are indicated by O, then:

$$\hat{O} = e^{\log\left(\frac{\hat{p}}{1-\hat{p}}\right)} = \frac{\hat{p}}{1-\hat{p}}$$

Rearranging the terms we have:

$$\hat{p} = \frac{\hat{O}}{1+\hat{O}}$$

The model enables the estimation of the probability  $\hat{p}$  of being at risk (for example, for at benchmark atrisk1, of belonging to a low SE class) for each set of values of the explanatory variables and therefore for each individual.

The estimated probability is then compared to a cut off probability value (a threshold). Each individual is predicted to be at risk (positive) if the estimated probability is greater than the cut off point, and is predicted not at risk (negative) if the estimated probability falls below the cut off point. The model, therefore, make it possible to identify individual at risk (positives) from their values of the explanatory variables.

To investigate the predictive efficiency of specific models the baseline model was also compared to a best fit model defined by a backward stepwise logistic regression.

This method starts with all explanatory variables included in the model. A series of rounds of regressions then removes individual variables until the combinations of variables that provide the best fit are achieved. Stepwise regression has been criticised for including variables that are less relevant, or variables with noise (Flack and Chang 1987; Griffiths and Pope 1987). It is also criticised for the potential problems of noise in the model, when using the Stata automated stepwise function.

Combining both the manual method of exploration of the variables shown in Chapter 4 to define the baseline model with the stepwise approach provides a rigorous basis for goodness of fit to then test for levels of accuracy.

### **Defining accuracy**

The extent to which explanatory variables lead to true positives and true negatives is a usual way of expressing the accuracy of a model. Accuracy is defined here as the case in which the predicted outcome matches the known outcome, the dependent variable.

Yerushalmy's (1947) definitions of sensitivity and specificity are used for diagnostic efficacy for measuring accuracy. Sensitivity can be defined as the true positive rate or the number of patients who are classified by the model as being at risk expressed as a proportion of the total number of patients who are identified in the benchmark category as being at risk. In the matrix below this is  $a / (a+c)$  or  $a / n_1$ . False positives are patients who are classified as being at risk who are actually not at risk. A false positive rate is calculated by  $b / b+d$  in the table 5.3 below, that is the proportion of all not at risk patients who are incorrectly classified as being at risk.



**Table 5.3 Calculation of sensitivity and specificity matrix**

Classification	Correct (gold standard) diagnosis		total
	present	absent	
Positive m1	a  (true positive)	b  (false positive)	
Negative m2	c  (false negative)	d  (true negative)	
TOTAL N	n1	n2	

Specificity is the true negative rate, that is the percentage of patients who are correctly classified as not being at risk according to the classification by the model, or  $d / (b+d)$  or  $d / n2$ . The false negative rate is the percentage of patients who are classified as not being in a low socio economic position who are in fact in a low socio economic position according to the classification ( $c / c+a$ ).

In most medical projects the aim of a diagnostic process is to have high levels of sensitivity and specificity, that is, the model should have high levels of true positives and true negatives.

However, in practice there often needs to be a compromise, given a trade off between the sensitivity and specificity. The decision as to which of the two measures is more important is given priority by an individual project's aims. The purpose of this research is to focus on identifying low socio economic position, so health interventions can take place. A particular focus then is on limiting the number of false negatives, that is, where a model predicts a patient as not being 'at risk', but is in fact at risk (ie in a low SEP defined by the dependent variable).

There is a difference between accuracy and usefulness, where the latter involves judgements on the practical and logistical application of the model to fulfil its intended purpose (Metz, 1986). It is possible a model can have high levels of accuracy, but be impractical to use, perhaps due to cost. In this project the possible resource implications of a focus on reducing false negatives is of particular interest. Swets and Pickett (1982) describe the usefulness in terms of practical application as 'efficacy'.

Problems outlined in the use of specificity and sensitivity have been cited in relation to medical diagnosis when the presence or absence of the condition being diagnosed is unknown. In this project, however, the benchmark is known and is seen to be the true state, thus overcoming this problem. In a practical application of this in a primary care setting, the problem of unknown classifications of the benchmarks would exist, as both NSSEC and income would be unknowns. The purpose of this research is therefore to find the combination of explanatory variables that can best measure low socio economic position given such uncertainties.

Zweig and Campbell (1993) explain how a single value for sensitivity and specificity is a misleading test of accuracy. They argue that any model will have several or many possible values of sensitivity and specificity, depending on a decision on a cut off point based on estimated probability values. It is therefore the whole spectrum of sensitivity and specificity values that provide a more complete assessment of accuracy.

### **Application to the models in this research**

In order to calculate sensitivity and specificity in this research it is necessary to calculate the predictive probabilities for the different combinations of explanatory variables for each model. For each of the dependent variables a model has a combination of explanatory variables, for example the baseline model has *social housing, low education and income benefit*

Since the three explanatory variables are all binary variables, there are eight possible sets of outcomes of the explanatory variables shown in table 5.4. (In general, when explanatory variables are binary, there will be  $2^K$  combinations possible, where  $K$  is the number of variables).

These eight combinations represent eight possible types of individuals – that is, individuals replying to questionnaires in surgeries according to these three proxies would fall into one of these possible eight types (if the baseline model was adopted).

So for example combination D ( 1 0 0 ) would represent individuals who was identified as receiving income benefit (income benefit = 1), not living in social housing (social housing = 0) and not having low education (low education = 0).

These combinations are ranked by their predictive probability to the dependent variable (in the case of table 5.4 above hypothetically). The order of the ranking is determined by the estimated probability ( $\hat{p}$ ) associated with each type of individual.

$$P_A < P_B < P_C < P_D < P_E < P_F < P_G < P_H$$

**Table 5.4** *Summary of combinations of proxies for baseline model*

Combination	Income Benefit	Low Education	Social Housing	Estimated probability of being classified as low SE status
A	0	0	0	$P_A$
B	0	0	1	$P_B$
C	0	1	0	$P_C$
D	1	0	0	$P_D$
E	0	1	1	$P_E$
F	1	0	1	$P_F$
G	1	1	0	$P_G$
H	1	1	1	$P_H$

*Note: The table assumes that the estimated coefficient of income benefit is higher than that of low educations, which, in turn, is higher than that of social housing. The table also assumes that no estimated coefficient is greater than the sum of the other two.*

The estimated probability for each combination of explanatory variables depends on the values of the logit estimated coefficients ( $\hat{\beta}$ ) in that particular model (see below). In table 5.4, a patient may be classified as positive in all three explanatory variables, that is *social housing*, *low education*, and *income benefit* all equal 1 which would yield the largest number of patients classified as atrisk as all the coefficients are positive. At the other end a patient would be classified as at least risk if *social housing*, *low education* and *income benefit* all equal to 0. The order between these two ends is then determined by the magnitude of the individual coefficients. The primary interest is in estimating the probability that a patient will be classified into the categories above, based on our sample population.

#### **Application to the models in this research: A numerical example using the classification atrisk1**

An applied example can clarify how the logit model can be used to classify individuals as atrisk or not. The logit model below uses the baseline model to identify whether individuals fall into the category atrisk1:

$$\text{Logit}(\hat{p}) = -1.376973 + .9132337 \times \text{social housing} + 1.575119 \times \text{low education} + 1.707628 \times \text{income benefit}$$

The method can be broken down into five steps

- 1) Coefficients for the explanatory variables are estimated using the logit regression as shown above for the baseline model

- 2) For each type of individual, the logit is calculated from the values of the coefficients and the explanatory variables. In combination D (individuals of type D) cited above the logit is equal to 0.330655, that is:

$$0.330655 = -1.37697 + 0.913234 \times 0 + 1.575119 \times 0 + 1.707628 \times 1$$

- 3) The logit is exponentiated to obtain the odds of the individual being at risk:

$$\hat{O} = \frac{\hat{p}}{1 - \hat{p}} = e^{\left(\frac{\hat{p}}{1 - \hat{p}}\right)} = e^{0.330655} = 1.38188$$

- 4) From the odds, the estimated probability of the individual classified as atrisk 1 is calculated. In the example of individuals who have the characteristics of D this would equal 0.581919:

$$\hat{p} = \frac{\hat{O}}{1 + \hat{O}} = \frac{1.38188}{1 + 1.38188} = 0.581919$$

- 5) Finally, the estimated probability is compared to a chosen cut off point to decide whether a type D individual should be classified as positive (atrisk1) or negative. If, for example, a cut off point of 0.5 was chosen, which is an often chosen threshold, type D individuals would be classified as at risk1, since  $\hat{p} = 0.581919$  is greater than 0.5. In this study, however, various cut off points are used (see the discussion below).

Table 5.5.shows the estimated probabilities for each combination of the explanatory variables to predict patients being classified as atrisk1, that is, being in a low socio economic position (NSSEC3), using the baseline model outlined above.

**Table 5.5 Estimated probabilities for baseline model combinations of explanatory variables**

	Logit	A	b1	sochous	b2	Lowed	b3	benefit	Odds Ratio	P
A	-1.37697	1.37697	0.913234	0	1.575119	0	1.707628	0	0.252341	0.201496
B	-0.46374	1.37697	0.913234	1	1.575119	0	1.707628	0	0.628927	0.386099
C	0.198146	1.37697	0.913234	0	1.575119	1	1.707628	0	1.21914	0.549375
D	0.330655	1.37697	0.913234	0	1.575119	0	1.707628	1	1.39188	0.581919
E	1.11138	1.37697	0.913234	1	1.575119	1	1.707628	0	3.038548	0.752386
F	1.243889	1.37697	0.913234	1	1.575119	0	1.707628	1	3.469077	0.77624
G	1.905774	1.37697	0.913234	0	1.575119	1	1.707628	1	6.72461	0.870544
H	2.819008	1.37697	0.913234	1	1.575119	1	1.707628	1	16.76021	0.943694

Combinations B, C and D in table 5.5 each have one of the explanatory variables identified (equalling one). So, in this case, income benefit is the strongest predictor because its estimated coefficient is the highest for the three explanatory variables. This is followed by low education and social housing. In other words, there is a greater probability of a patient in combination D being classified in a low socio economic position by the benchmark variable than combinations, A, B or C. It is possible that the individual strength of the one explanatory variable can be greater than a combination of two other explanatory variables (e.g. it is possible that D could be ranked higher than E) when the coefficient of that variable is larger than the sum of the other two coefficients – this is the case of income benefit in some instances.

### **Using multiple cut off points: The Receiver Operating Characteristic (ROC) curve**

As the example showed, the estimated probabilities  $\hat{p}$  are used to predict whether an individual patient is at risk or not by comparing them to a chosen cut off point. While often studies use a standard value of 0.5 a range of cut off values are used to generate a spectrum of values for sensitivity and specificity as suggested by Zweig and Campbell (1993).

Where multiple cut off points are used to derive the allocation of patients into a binary classification, in this case either in low SEP or not in low SEP, the accuracy of the model can be assessed using a Receiver Operating Characteristic curve (ROC) (Kirkwood and Sterne, 2003). These cut off points can be described as decision thresholds in the sense that each cut off point yields different sensitivity and specificity, leading to the inclusion or exclusion of different patients as being classified as being in a low socio economic position. For each cut off point selected, a model will allocate patients into two separate populations, those who are classified as being in low SEP and those who are not in low SEP. As discussed above some patients will be allocated correctly, that is they are true



positives (sensitivity) or true negatives (specificity); however some patients will be allocated incorrectly, that is, false positives and false negatives.

Each combination of explanatory variables is a unique position with its own estimated probability value. A value for the cut off point can be selected anywhere between the value associated with the probability for a particular combination of explanatory variables and the value for next highest or lowest combination of explanatory variables based on their estimated probability. It was shown above that the baseline model has three explanatory variables and therefore there are eight types of individuals (combinations of values for the three variables), and an estimated probability values is associated with each type.

Therefore, seven possible cut off points between the estimated probability values are considered.

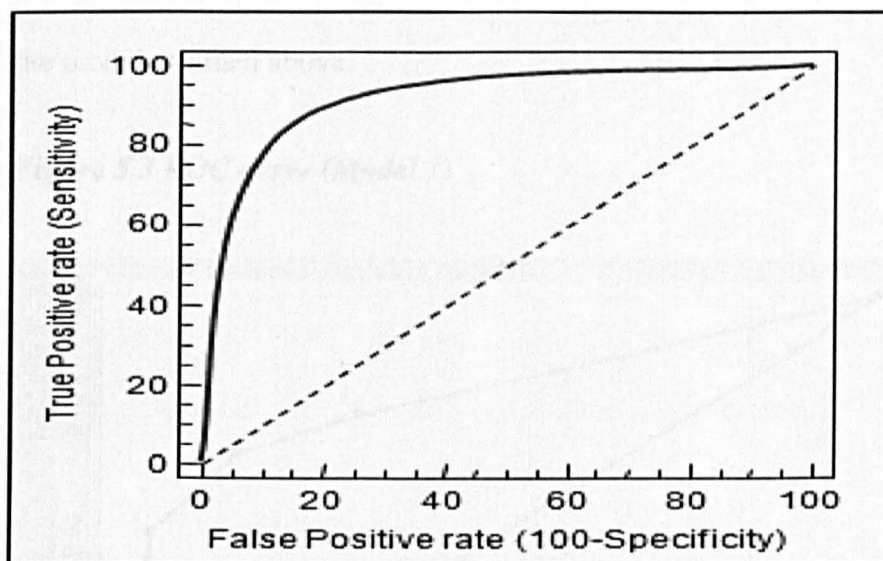
In fact, there are two additional possible cut off points: one below the lowest  $\hat{p}$  (that is, between zero and the lowest  $\hat{p}$ ), and the other above the highest  $\hat{p}$  (that is, between the highest  $\hat{p}$  and one). However, these cases are not considered in this study because the extreme cases of zero and one are not practically relevant to this study. A probability cut of zero means that all individuals are classified as at risk, whilst a probability cut of one means that all individuals are classified as not at risk.

In the example of the baseline model shown in table 5.5 the eight combinations (A-H) could have nine cut off points, including the two trivial cases mentioned above. The first would be below 0.20, the second, between 0.20 and 0.38, with the last above 0.94.

The ROC curve plots all possible combinations of sensitivity and specificity (Metz 1978) for a particular model. It can be seen as a graphical representation of the spectrum of sensitivity and specificity. The method thus can be used to aid decision making through its ability to test a model's discrimination between two outcomes – in this case low or non low socio economic position.

There is a trade off between sensitivity and specificity. When cut off values are increased true positives increase (false negatives decrease), but at a cost of lower specificity rates (true negative rate).

The ROC curve plots this trade off between sensitivity and specificity.



**Figure 5.2 The ROC curve**

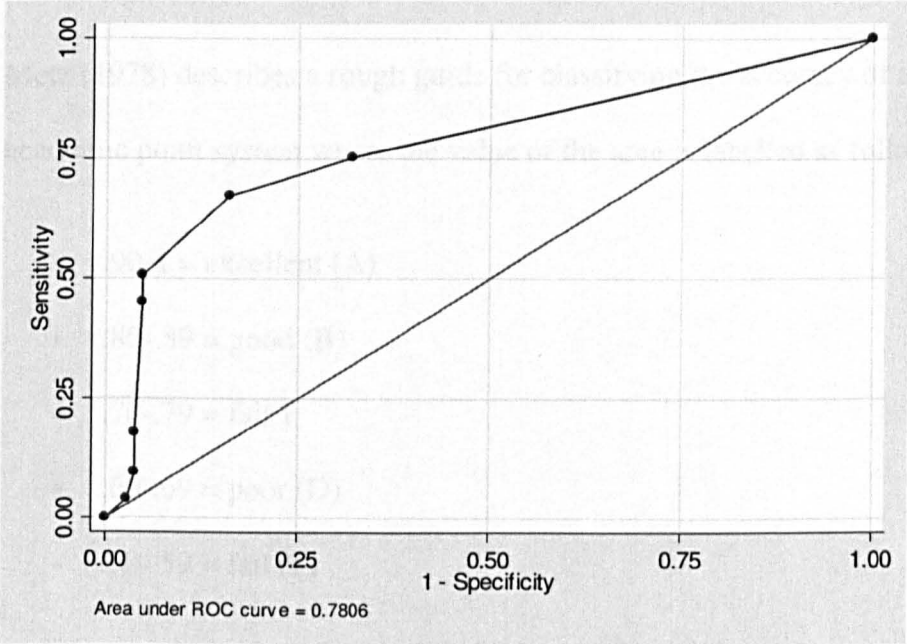
The curve is thus derived from plotting the values of two measures; first, the true positive rate (ie patients who are correctly classified as being in a low socio economic position as a proportion of total number of patients in a low socio economic position); and second, the false positive rate (ie. patients classified as being in a low socio economic position who are not in a low socio economic position as proportion of the total number of patients not in a low socio economic position) at selected cut off points.

The y axis thus shows the true positive rate (sensitivity) and the x axis shows the false positive rate. A model that has perfect discrimination will have 100% true positives and 100% true negatives, while one with no discrimination would have either no true positives or true negatives. Most plots will be somewhere between these two extremes. The ROC

curve has conventionally been used in clinical trials and has been adopted in this different context to analyse the trade offs between sensitivity and specificity outlined above.

An ROC is then plotted using all the selected cut off points including the extreme positions of classifying everyone as atrisk or nobody at risk. Throughout this chapter these two extreme positions are not presented in the accompanying tables for each model, although the accompanying ROC curves are derived from all the plots as shown below in relation to the model outlined above.

**Figure 5.3 ROC curve (Model 1)**



The extreme positions of selecting all individuals or none is excluded as there would be no discrimination. However, overall accuracy may still be reasonably high depending on the proportion of true positives. The lower the proportion of patients in a low socio economic position in a sample population, the higher the overall accuracy of classifying no patients as being in low socio economic position. Further discussion of selecting cut off points is found at the end of this chapter.

The area under the ROC curve provides an estimate of the overall accuracy of a model. If a model had 100% sensitivity and 100% specificity (100% accuracy) the ROC curve would go along the top of the grid and the area would be equal to 1 and can be described as having perfect accuracy. The closer the curve is to the 45 degree line the lower the value. At this extreme a model with a value of the area equal to 0.5 (ie: the curve coincides with the 45 degree line) has zero accuracy in discriminating. The area under the curve and above the 45 degrees line therefore represents the effectiveness of a model to accurately separate two groups of patients, those who are in a low socio economic position and those who are not.

Metz (1978) describes a rough guide for classifying the accuracy of a diagnostic test as the academic point system where the value of the area is labelled as follows:

- .90-1 = excellent (A)
- .80-.89 = good (B)
- .70-.79 = fair I
- .60-.69 = poor (D)
- .50-.59 = fail (F)

This process provides flexibility where different cut offs provide different values for sensitivity (and thus false negatives), specificity and overall accuracy. It also enables the practical outcome to easily identify which combination of proxies can be used to classify a patient as being in a low socioeconomic position. For example, if combination D, (income benefit = 1) provided an acceptable level of false negatives and accuracy, all patients D to H would be classified as low SEP.

This approach allows the researcher to set an acceptable sensitivity value based on a probability cut off value. A trade off between the two measures exist, with lower sensitivity values yielding higher specificity values. When adjusting the probability thresholds, the lower the threshold the lower the proportion of false negatives, but the higher the proportion of false positives. As will be shown, there are possible trade offs between overall accuracy and reducing false negatives.

The calculation of sensitivity and specificity were derived using the *lstat* command in Stata. Measures of sensitivity and specificity for selected models will be shown using different selected cut off points.

Tests for sensitivity and specificity in this project use different probability cut-offs for predicting positive outcomes relating to different binary values of the explanatory variables in the specific models.

## **Presentation of results**

Results are presented comparing the baseline model to the stepwise model for each at risk classification and will take the following form.

- 1) The logistic regression model equation is given with the odds ratios of the explanatory variables and outlined. P values for individual odds ratios and for the overall model. Odds ratios are shown for ease of interpretation.

- 2) The cut off points identified from the probabilities for calculating sensitivity and specificity are shown corresponding to the combination of variables selected in the model. The cut off points are chosen between the estimated probability points, which in turn correspond to each type of individual.

- 3) The ROC curve is shown and commented on to indicate overall accuracy and as a comparator between models.
- 4) Sensitivity and specificity rates at the different cut off points are shown and commented on and comparisons made between the baseline and stepwise models.

## 5.3 Results

### Atrisk1 – Low Socio Economic position as NS-SEC =3

Model 1 has a dependent variable of NSSEC3 and three explanatory variables of social housing, low education and being in receipt of income benefit. The logistic regression model is shown below:

$$\text{Logit (p) NSSEC3} = - 1.376973 + .9132337 \text{ social housing} + 1.575119 \text{ low education} + 1.707628 \text{ income benefit}$$

*Model 1: Dependent Variable (Atrisk1): Low Socio Economic Position classified as being in NSSEC3*

Variable	Odds Ratio	Std. Err.	Z	P> z	[95% Conf. Interval]	
Social housing	2.492369	.9373398	2.43	0.015	1.192585	5.208774
Low education	4.831318	1.808678	4.21	0.001	2.319558	10.06297
Income benefit	5.515861	3.410523	2.76	0.006	1.641743	18.53196

Number of obs = 179

Prob > chi2 = 0.0000

The logistic model shows the odds of patients in social housing being in NSSEC3 are 2.49 the odds of non-social housing patients; the odds of patients with a low education are 4.83 times the odds of patients with higher education backgrounds; and the odds of patients receiving income benefit are 5.52 times the odds of patients not receiving income benefit

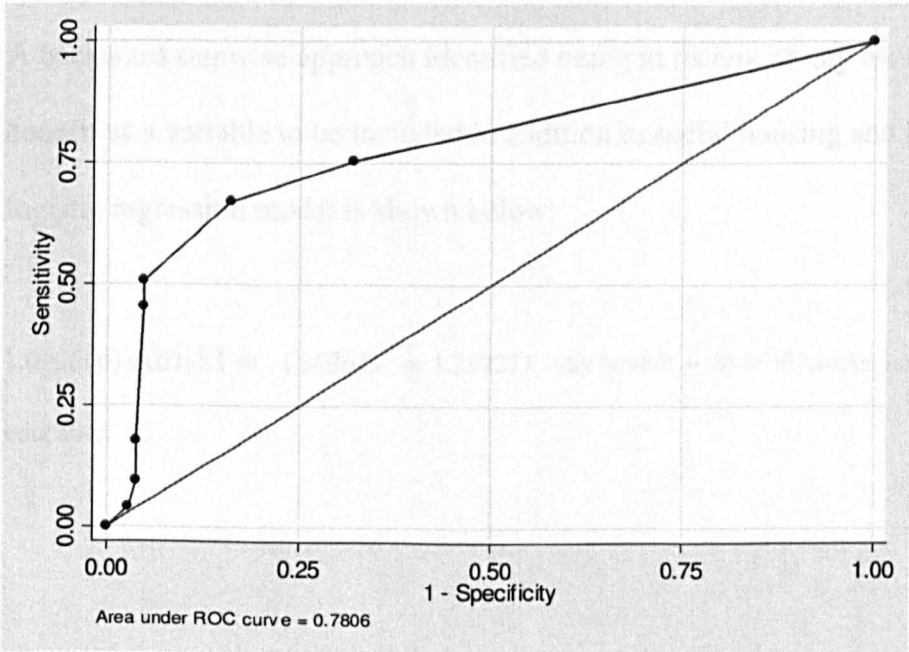
being classified as NSSEC3. All the explanatory variables are statistically significant at the 5% level.

The ROC curve below shows an overall accuracy level of 0.7806 according to the area under the curve, which is towards the high end of the fair classification. This was derived from the cut off points set by the probability calculations of the different possible outcomes from the explanatory variables ( see below).

Table 5.6 Model 1 combination of explanatory variables

Income	Social	Low	Estimated
Benefit	Housing	Education	Probability
0	0	0	0.2015
0	1	0	0.3861
0	0	1	0.5494
1	0	0	0.5819
0	1	1	0.7524
1	1	0	0.7762
1	0	1	0.8705
1	1	1	0.9437

Figure 5.4 ROC Curve Model 1





**Table 5.7 Sensitivity and Specificity for Atrisk1 Model 1**

<b>Cut Off</b>	<b>Sensitivity</b>	<b>Specificity</b>	<b>Overall Accuracy</b>
0.9	4.1	97.2	59.2
0.85	9.6	96.2	60.9
0.76	17.8	96.2	64.3
0.74	45.2	95.3	74.9
0.57	50.7	95.3	77.1
0.53	67.1	84.0	77.1
0.35	75.3	67.9	70.9

The false negative rate is a prime concern of this project. Table 5.7 illustrates the different combinations of sensitivity and specificity. The trade off with specificity or true negatives becomes more significant below a cut off point of 0.57 above. At the 0.35 probability cut off, which corresponds to a patient being classified as 1 for at least one of the explanatory variables, false negatives fall to 25% and overall accuracy is 70.9%, seven percentage points lower than its highest level. However, specificity falls to 67.9% at this point, that is approximately a third of patients classified as at risk are false positives.

A backward stepwise approach identified being in receipt of any benefit rather than income benefit as a variable to be included in addition to social housing and low education. The logistic regression model is shown below:

$$\text{Logit (p) Atrisk1} = -1.502643 + 1.289277 \text{ any benefit} + .8636367 \text{ social housing} + 1.562682 \text{ low education}$$

**Model 1A: Dependent Variable (Atrisk1): Low Socio Economic Position classified as being in NSSEC3**

Variable	Odds Ratio	Std. Err. Z	z	P>z	[95% Conf. Interval]
Any benefit	3.63016	1.477641	3.17	0.002	1.634737 8.061274
Social Housing	2.37177	.8975948	2.28	0.022	1.12963 4.97977
Low education	4.771603	1.795357	4.15	0.001	2.282404 9.975535

Number of obs = 179

Prob > chi2 = 0.0000

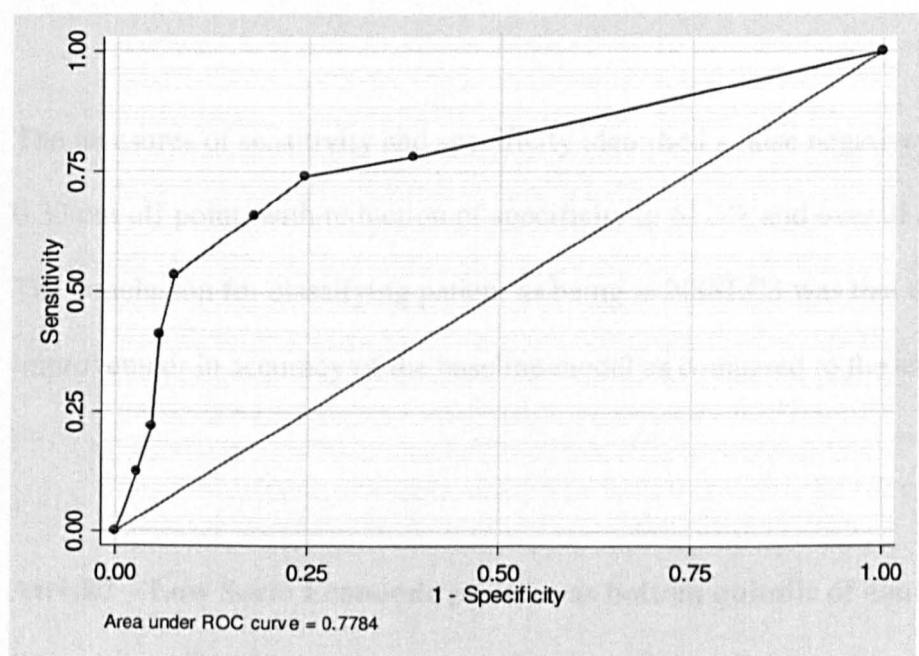
The logistic model shows the odds of patients in social housing are 2.37 times the odds of non-social housing patients being classified as NSSEC3; the odds of patients with a low education are 4.77 more times the odds of patients with higher education backgrounds; and patients receiving any benefit have odds 3.63 times the odds of patients with no benefit at being classified as NSSEC3. All the explanatory variables are statistically significant at the 5% level.

The ROC curve below shows an overall accuracy level of 0.7784 according to the area under the curve which is towards the high end of the fair classification, but marginally lower than in Model 1 above. This was derived from the cut off points set by the probability calculations of the different possible outcomes from the explanatory variables (see below)

Table 5.8 Model 1A combination of explanatory variables

Any Benefit	Social Housing	Low Education	Estimated Probability
0	0	0	0.18203
0	1	0	0.34547
1	0	0	0.44686
0	0	1	0.51501
1	1	0	0.65707
0	1	1	0.71579
1	0	1	0.79402
1	1	1	0.90141

Figure 5.5 ROC curve for Model 1A



**Table 5.9 Sensitivity and Specificity for Atrisk1 Model 1A**

Cut Off	Sensitivity	Specificity	Overall Accuracy
0.89	12.3	95.2	62.6
0.78	21.9	95.3	65.4
0.70	41.1	94.3	72.6
0.64	53.4	94.4	76.5
0.50	65.7	82.1	75.4
0.43	74.0	75.5	74.9
0.33	78.1	61.3	68.2

The measures of sensitivity and specificity identified a false negative rate of 22% at the 0.33 cut off point, with reduction of specificity to 61.3% and overall accuracy of 68.2%. The conclusion for classifying patient as being in NSSEC3 was that there was a marginal improvement in accuracy of the baseline model as compared to the stepwise model.

**Atrisk2 – Low Socio Economic position as bottom quintile of equivalised household income**

Model 2 has a dependent variable of atrisk2 and three explanatory variables of social housing, low education and being in receipt of income benefit. The logistic regression is shown below:

$$\text{Logit (p) atrisk2} = -2.160493 + 1.988945 \text{ income benefit} + .4551936 \text{ social housing} + .6365472 \text{ low education}$$

## Model 2

*Dependent Variable (Atrisk2): Low Socio Economic Position classified as being in bottom quintile of equivalised household income*

Variable	Odds Ratio	Std. Err.	Z	P>z	[95% Conf. Interval]
income benefit	7.307818	2.846124	5.11	0.000	3.406248 15.67831
social housing	1.576479	.5251719	1.37	0.172	.8205925 3.028647
low education	1.889944	.6210513	1.94	0.053	.992515 3.598826

Number of obs = 292

Prob > chi2 = 0.0000

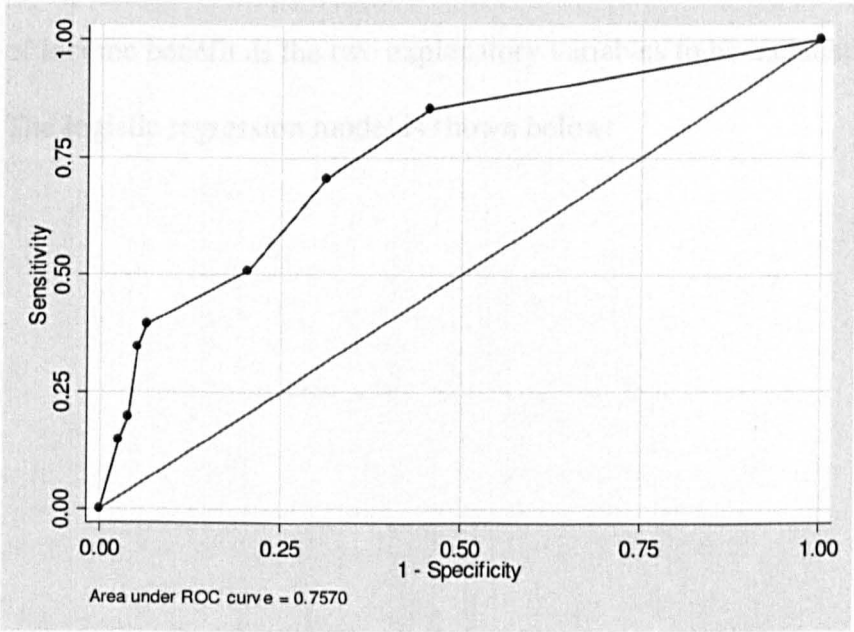
The logistic model shows the odds of patients on income benefit are 7.3 times the odds of patients not on income benefit being classified as being in the bottom income quintile; the odds of patients living in social housing are 1.6 times the odds of patients not living in social housing; and the odds of patients with low education are 1.9 times the odds of patients in low education being classified in the bottom income quintile. Both social housing and low education were not statistically significant at the 5% level with values of 0.172 and 0.053 respectively. The strength of the income benefit coefficient can be seen by its ranking being individually higher than the combination of social housing and low education. It is also the only statistically significant variable in the model.

The mean probabilities for each possible outcome of explanatory variables are shown below. The strength of the coefficient of the income benefit variable explains its ranking as higher than the combination of social housing and low education in Table 5.10.

5.10 Model 2 Combination of explanatory variables

Income Benefit	Social Housing	Low Education	Estimated Probability
0	0	0	0.10335
0	1	0	0.15377
0	0	1	0.17888
0	1	1	0.25564
1	0	0	0.45722
1	1	0	0.57044
1	0	1	0.6142
1	1	1	0.71508

**Figure 5.6 ROC Curve for Model 2**



The ROC curve shows a reasonable level of overall accuracy (0.757), but not as high as with Model 1. The false negative rate is at its lowest at the 0.14 cut off with a value of 15%. However there is a trade off, with a value of 54.6% for specificity and overall accuracy of 61% some 21 percentage points lower than at the 0.56 cut off point.

Table 5.11 Sensitivity and Specificity for Model 2

Cut Off	Sensitivity	Specificity	Overall Accuracy
0.70	14.7	97.4	80.1
0.60	19.7	96.1	80.1
0.56	34.4	94.8	82.3
0.44	39.3	93.5	82.2
0.24	50.8	79.6	73.6
0.16	70.5	68.8	69.2
0.14	85.2	54.6	61.0

A stepwise approach identified problems with affordability of heating and being in receipt of income benefit as the two explanatory variables to be included in the model for atrisk2.

The logistic regression model is shown below:

Logit (p) atrisk2 = -2.095742 + .9227133 heating + 2.10953 income benefit

#### Model 2A

*Dependent Variable (Atrisk2): Low Socio Economic Position classified as being in bottom quintile of equivalised household income*

Variable	Odds Ratio	Std. Err.	Z	P>z	[95% Conf. Interval]
heating	2.516108	.8223198	2.82	0.005	1.325983 4.774422
income benefit	8.244366	3.182924	5.46	0.000	3.868403 17.57045

Number of obs = 288

Prob > chi2 = 0.0000

The logistic model shows the odds of patients on income benefit are 8.2 times the odds of patients not on income benefit being classified in the bottom income quintile. Patients who state problems with affordability of heating have odds 2.5 times the odds of patients not having problems with affordability of heating. Both explanatory variables are statistically significant at the 5% level.

The mean probabilities for each possible outcome of explanatory variables are shown below in table 5.12. The value of 0.7304 for the ROC curve is towards the bottom end of the fair classification of accuracy and lower than the baseline model. The lowest false negative rate at the 0.22 cut off point was 32% higher than the baseline model, although at this cut off specificity was higher (71.2) and overall accuracy (70.5).

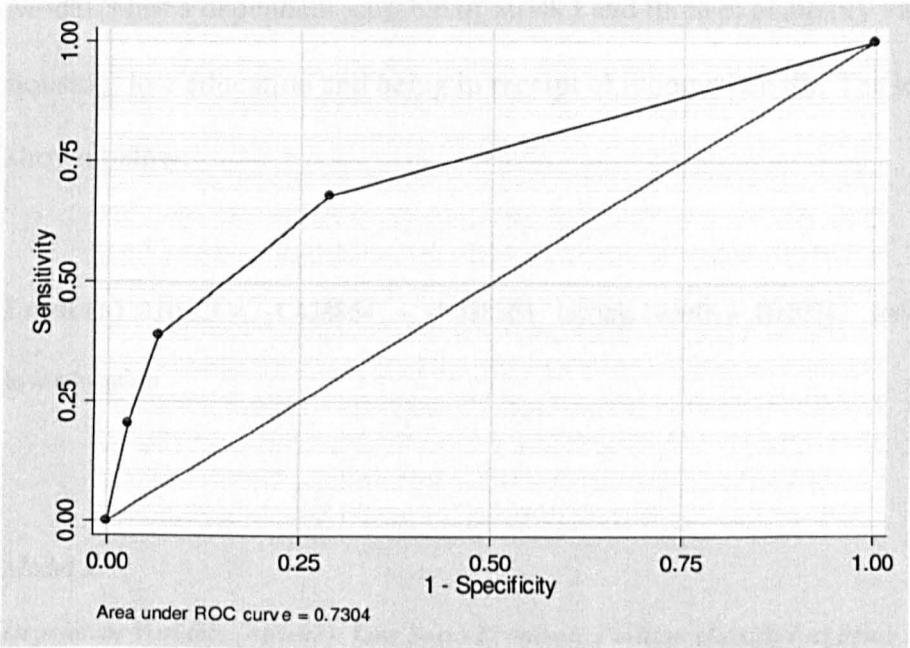


The baseline model (Model 2) provided a stronger model to reduce false negatives than the stepwise model (Model 2A).

Table 5.12 Model 2A combination of explanatory variables

Heating	Income	Estimated
	Benefit	Probability
0	0	0.1095
1	0	0.2363
0	1	0.5034
1	1	0.7184

Figure 5.7 ROC Curve Model 2A



**Table 5.13 Sensitivity and specificity Atrisk2 Model 2A**

Cut Off	Sensitivity	Specificity	Overall Accuracy
0.70	20.3	97.4	81.6
0.49	38.9	93.4	82.3
0.22	67.8	71.2	70.5

**Atrisk3 – Low Socio Economic position as bottom two quintiles of equivalised household income**

Model 3 has a dependent variable of atrisk3 and three explanatory variables of social housing, low education and being in receipt of income benefit. The logistic regression is shown below:

$$\text{Logit (p) atrisk3} = -1.438864 + -1.438864 \text{ income benefit} + .8040043 \text{ social housing} + .726484 \text{ low education}$$

**Model 3**

**Dependent Variable (Atrisk3): Low Socio Economic Position classified as being in bottom two quintiles of equivalised household income**

Variable	Odds Ratio	Std. Err. Z	P>z	[95% Conf. Interval]
Income benefit	5.862493	2.461017	4.21	0.000 2.574876 13.34776
Social housing	2.234471	.6288562	2.86	0.004 1.287115 3.879107
Low education	2.067797	.587873	2.56	0.011 1.184437 3.609972

Number of obs = 292

Prob > chi2 = 0.0000

The logistic model shows the odds of patients on income benefit being classified as in the bottom two income quintile are 5.9 times the odds of patients not being in receipt of income benefit; patients living in social housing have 2.2 times the odds of patients not living in social housing; and the odds of patients with low education are 2.1 times the odds of patients not having low education being classified in the bottom two income quintiles. All the explanatory variables are statistically significant at the 5% level.

The mean probabilities for each possible outcome of explanatory variables are shown in Table 5.14. The strength of the income benefit variable coefficient explains its higher ranking than when social housing and education are combined. The value of the area in the ROC curve was 0.737, towards the bottom end of the fair classification of accuracy. Overall levels of accuracy across cut off points did not significantly change 71.9% to 66.4%, the latter having the smallest false negative rate of 22%.

**Table 5.14 Model 3 Combination of explanatory variables**

<b>Income Benefit</b>	<b>Social Housing</b>	<b>Low Education</b>	<b>Estimated Probability</b>
0	0	0	0.19172
0	0	1	0.32907
0	1	0	0.34641
0	1	1	0.52289
1	0	0	0.58169
1	0	1	0.74196
1	1	0	0.75652
1	1	1	0.86532

Figure 5.8 ROC Curve Model 3

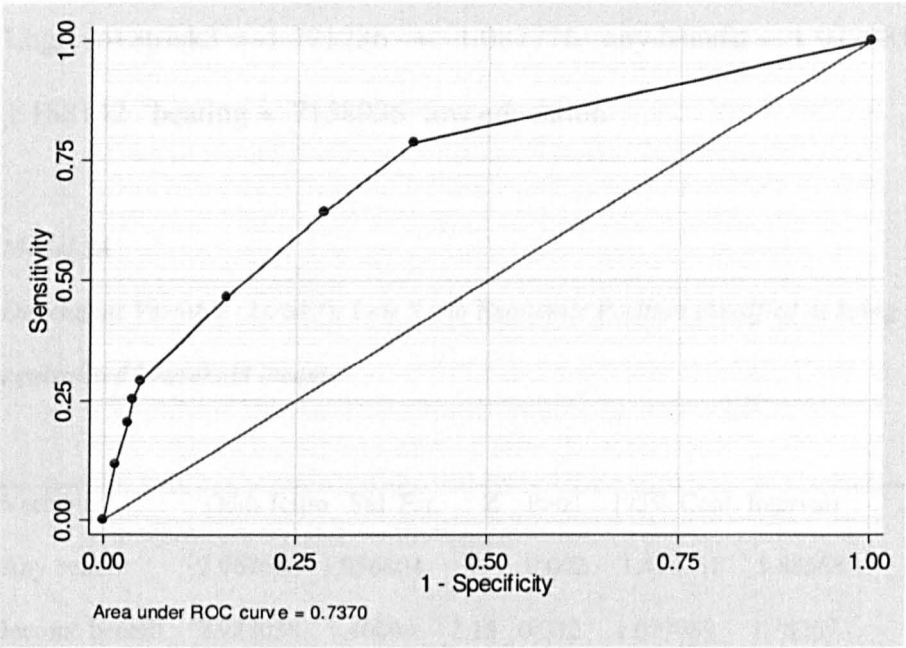


Table 5.15 Sensitivity and specificity Model 3

Cut Off	Sensitivity	Specificity	Overall Accuracy
0.85	11.6	98.4	67.8
0.74	25.2	96.3	71.2
0.73	25.2	96.3	71.2
0.57	29.1	95.2	71.9
0.51	46.6	84.1	70.9
0.33	64.1	71.4	68.8
0.31	78.6	59.8	66.4

A stepwise approach identified four explanatory variables for predicting low socio economic position as bottom two income quintiles, these being; in receipt of any benefit; in receipt of income benefit problems; affordability of heating; and low education.

The logistic regression model (Model 3A) is shown below:

$$\text{Logit (p) atrisk3} = -1.771236 + 1.087776 \text{ any benefit} + 1.072281 \text{ income benefit} + 1.188142 \text{ heating} + 0.7158936 \text{ low education}$$

**Model 3A**

*Dependent Variable (Atrisk3): Low Socio Economic Position classified as being in bottom two quintiles of equivalised household income*

Variable	Odds Ratio	Std. Err.	Z	P> z	[95% Conf. Interval]	
Any benefit	2.967666	1.036804	3.11	0.002	1.496351	5.88568
Income benefit	2.922038	1.46048	2.15	0.032	1.097089	7.78269
Heating	3.28098	.9856771	3.95	0.000	1.820893	5.911843
Low education	2.046014	.6069617	2.41	0.016	1.143918	3.659505

Number of obs = 288

Prob > chi2 = 0.0000

The logistic model shows the odds of patients on income benefit being classified in the bottom two income quintiles are 2.9 times the odds of patients not on income benefit; the odds of patients receiving any benefit are 3 times the odds of patients not receiving any benefit; the odds of patients who state affordability of heating are 3.3 times the odds of patients who state they do not have problems with affordability of heating; and the odds of patients with low education are twice the odds of patients not having low education of being classified in the bottom two income quintiles. All the explanatory variables are statistically significant at the 5% level.

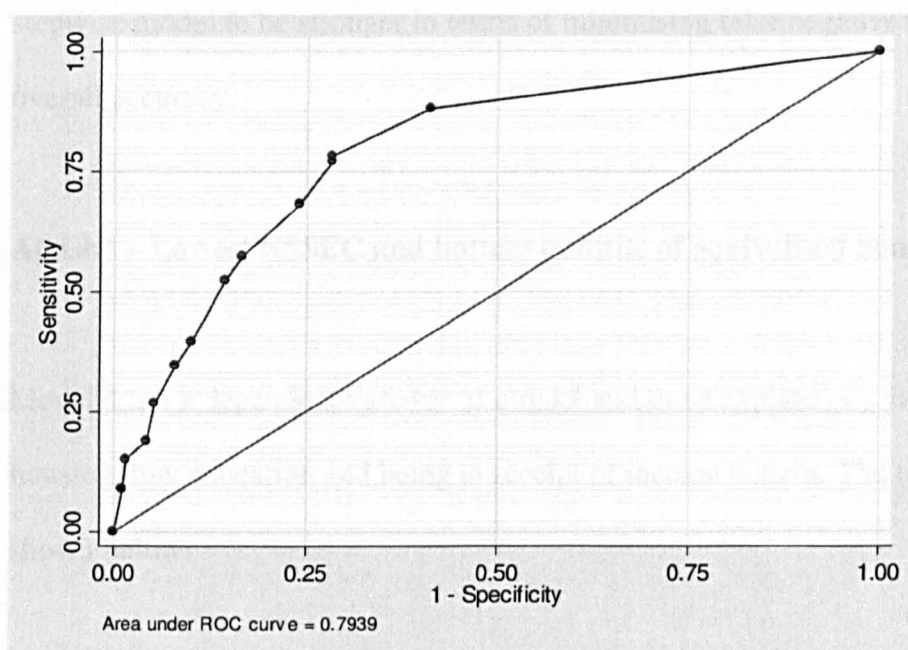
Table 5.16 has 13 cut off points rather than 15 that may be expected with four explanatory variables. This is due to no patients being classified into certain combinations of variables.

For example there were no patients who were coded as 1 for just income benefit and social housing. The value of the area in the ROC curve was 0.7939 just below the good classification and significantly higher than the baseline model classification of accuracy. A false negative rate of just 12% was achieved at the 0.24 cut off point with overall accuracy at this point of 69.1%, 5.2 percentage points lower than the highest accuracy cut off point of 0.49.

**Table 5.16 Model 3A Combination of explanatory variables**

Any Benefit	Income Benefit	Heating	Low Education	Estimated Probability
0	0	0	0	0.14539
0	0	0	1	0.2582
0	1	0	0	0.33204
1	0	0	0	0.33549
0	0	1	0	0.35822
1	0	0	1	0.50811
0	0	1	1	0.53315
1	1	0	0	0.596
1	0	1	0	0.62356
1	0	1	1	0.77216
1	1	0	1	0.75114
1	1	1	0	0.82877
1	1	1	1	0.90828

**Figure 5.9 ROC Model 3A**



**Table 5.17 Sensitivity and specificity Model 3A Atrisk3**

Cut Off	Sensitivity	Specificity	Overall Accuracy
0.89	8.9	98.9	67.4
0.81	14.8	98.4	69.1
0.76	18.8	95.7	68.7
0.74	26.7	94.6	70.8
0.61	34.6	92.0	72.9
0.58	39.6	89.8	72.2
0.52	52.5	85.6	74.0
0.49	57.4	83.4	74.3
0.34	68.3	75.9	73.2
0.334	77.2	71.7	73.6
0.331	78.2	71.7	74.0
0.24	88.1	58.8	69.1

The comparison of the baseline model with the stepwise model for atrisk3 showed the stepwise model to be stronger in terms of minimising false negatives without sacrificing overall accuracy.

#### **Atrisk4 – Lowest NSSEC and bottom quintile of equivalised household income**

Model 4 has a dependent variable of atrisk4 and three explanatory variables of social housing, low education and being in receipt of income benefit. The logistic regression is shown below:

$$\text{Logit (p) atrisk 4} = -2.510667 + 1.712184 \text{ income benefit} + .5382832 \text{ social housing} + .3736182 \text{ low education}$$

#### **Model 4**

***Dependent Variable (Atrisk4): Low Socio Economic Position classified as being in NSSEC=3 and bottom quintile of equivalised household income***

Variable	Odds Ratio	Std. Err.	Z	P>z	[95% Conf. Interval
income benefit	5.54105	2.964453	3.20	0.001	1.941782 15.81188
social housing	1.713063	.8316944	1.11	0.268	.6614759 4.436422
low education	1.452982	.7077188	0.77	0.443	.5593157 3.774537

Number of obs = 172

Prob > chi2 = 0.0020



The logistic model shows the odds of patients on income benefit being classified as atrisk3 are 5.5 times the odds of patients not on income benefit; patients, patients living in social housing have odds 1.7 times the odds of patients with not living in social housing; and the odds of patients with low education 1.4 times the odds of patients classified as not having low education of being classified as atrisk 3. Social housing (0.268) and low education (0.443) were not statistically significant at the 5% level.

The value of the area in the ROC curve was 0.718 just above the bottom end of the fair classification of accuracy. Overall levels of accuracy across cut off points significantly changed across the cut off points from 86.1%% at a cut off of 0.42 to as low as 59.3% at the 0.09 cut off. Even at the lowest cut off the false negative rate was 17%. This at risk category is the narrowest in terms of true positives requiring patients to be classified as both atrisk1 and atrisk 3.

***Table 5.18 Model 4 Combination of explanatory variables***

<b>Income Benefit</b>	<b>Social Housing</b>	<b>Low Education</b>	<b>Estimated Probability</b>
0	0	0	0.07511
0	0	1	0.10555
0	1	0	0.12213
0	1	1	0.16815
1	0	0	0.31035
1	0	1	0.39535
1	1	0	0.43531
1	1	1	0.52832

Figure 5.10 ROC Curve Model 4

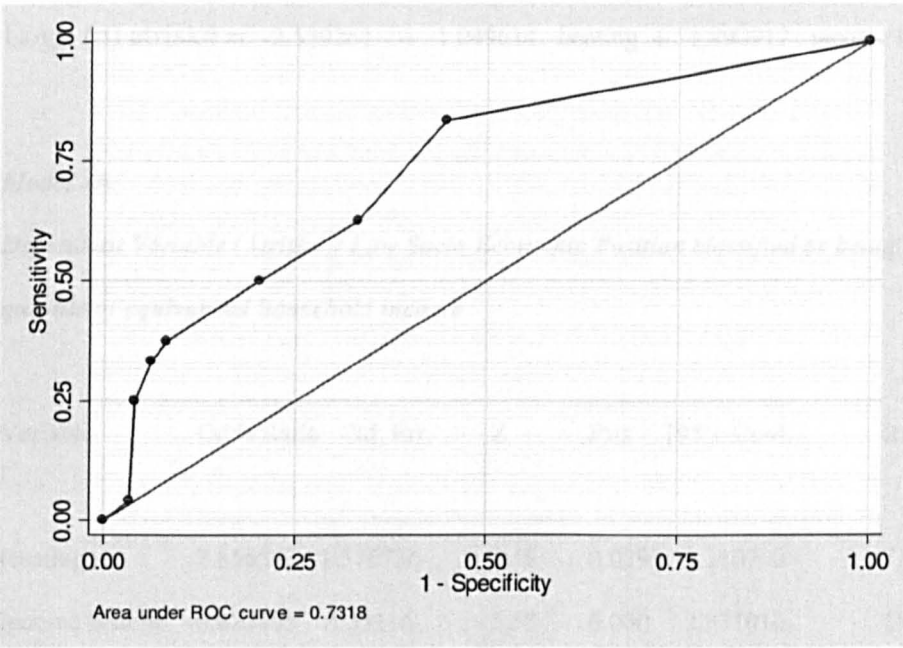


Table 5.19 Sensitivity and specificity Model 4

Cut Off	Sensitivity	Specificity	Overall Accuracy
0.51	4.2	96.6	83.7
0.42	25.0	95.9	86.1
0.38	33.3	93.9	85.5
0.30	37.5	91.9	84.3
0.15	50.0	79.7	75.6
0.11	62.5	66.9	66.3
0.09	83.3	55.1	59.3

A stepwise approach identified being in receipt of income benefit problems and affordability of heating as the two explanatory variables to be included in a model for atrisk4 (Model 4A)

The logistic regression model (Model 4A) is shown below:

$$\text{Logit (p) atrisk4} = -2.539261 + 1.049614 \text{ heating} + 1.890912 \text{ income benefit}$$

#### **Model 4A**

***Dependent Variable (Atrisk4): Low Socio Economic Position classified as being in NSSEC=3 and bottom quintile of equivalised household income***

Variable	Odds Ratio	Std. Err.	Z	P>z	[95% Conf. Interval]
Heating	2.856547	1.376736	2.18	0.029	1.110703 7.346574
Income benefit	6.625405	3.53116	3.55	0.000	2.331016 18.83127

Number of obs = 170

Prob > chi2 = 0.0002

The logistic model shows the odds of patients on income benefit being classified as atrisk4 are 6.6 times the odds of patients not on income benefit, the odds of patients stating that they had problems with affordability of heating housing are 2.9 times the odds of patients without problems of affordability of heating. Both explanatory variables are statistically significant at the 5% level.

The value of the area in the ROC curve was 0.756 in the middle of the fair classification of accuracy. At the 0.17 cut off point the false negative rate was 25% with overall accuracy 72.9% at this cut off point

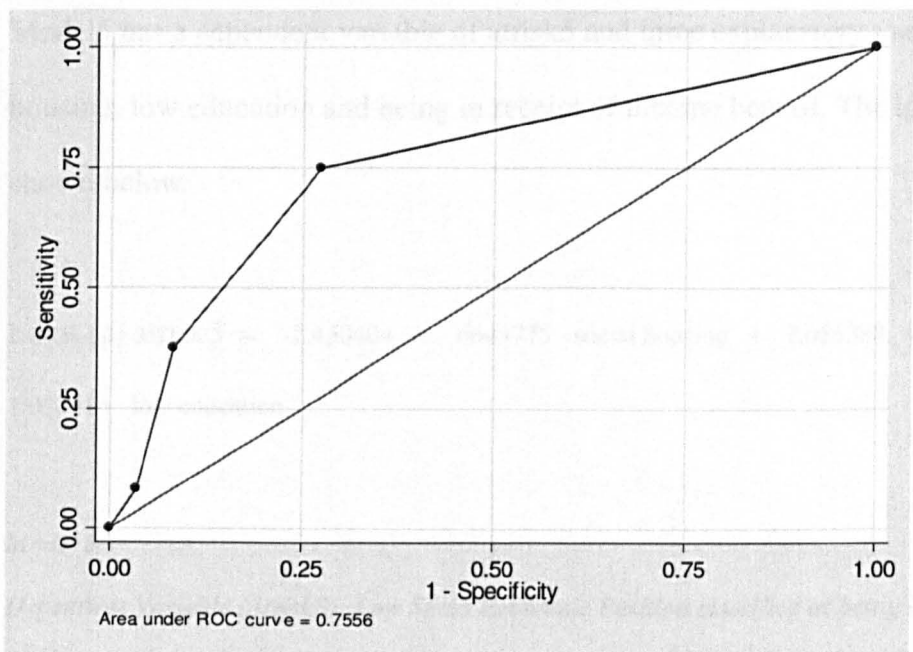
Both the baseline model and the stepwise model for atrisk4 had poorer levels of accuracy and higher false negatives than other dependent models within the project. The number of

true positives in the sample for atrisk4 is 24 patients which could be argued to be a too narrow classification.

**Table 5.20 Model 4A Combination of explanatory variables**

Heating	Income Benefit	Estimated Probability
0	0	0.0731512
1	0	0.1839746
0	1	0.3433615
1	1	0.5989913

**Figure 5.11 ROC Curve Model 4A**



**Table 5.21 Sensitivity and specificity for Model4A Atrisk4**

Cut Off	Sensitivity	Specificity	Overall Accuracy
0.58	8.3	96.7	84.1
0.33	37.5	91.8	84.1
0.17	75.0	72.6	72.9

**Atrisk5– Lowest NSSEC and bottom two quintiles of equivalised household income**

Model5 has a dependent variable of atrisk5 and three explanatory variables of social housing, low education and being in receipt of income benefit. The logistic regression is shown below:

$$\text{Logit (p) atrisk5} = -2.450404 + .6645775 \text{ social housing} + 2.055388 \text{ income benefit} + 1.032516 \text{ low education}$$

**Model 5**

**Dependent Variable (Atrisk5): Low Socio Economic Position classified as being in NSSEC=3 and bottom quintile of equivalised household income**

Variable	Odds Ratio	Std. Err.	Z	P>z	[95% Conf. Interval]
Income benefit	7.809867	4.132379	3.88	0.000	2.768557 22.03098
Social housing	1.943669	.8590795	1.50	0.133	.8173367 4.622146
Low education	2.808123	1.232017	2.35	0.019	1.188408 6.635391

Number of obs = 172

Prob > chi2 = 0.0000

The logistic model shows the odds of patients on income benefit being classified as atrisk5 are 7.8 times the odds of patients not on income benefit; the odds of patients living in social housing are 1.9 times the odds of patients not living in social housing; and the odds of patients with low education are 2.8 times the odds of patients classified as not having low education of being classified in atrisk5 category. Social housing was not significant at the 5% level (0.133).

The value of the area in the ROC curve was 0.793, just below the good classification of accuracy. At the lowest cut off point the false negative rate was 15%, however there was significant fall in overall accuracy at this point (63.9) as a result of a specificity rate of 58.7%.

Table 5.22 shows the calculations for the probabilities for each combination of explanatory variable. As in earlier cases the income benefit variable has particular strength.

**Table 5.22 Model 5 Combination of explanatory variables**

<b>Income Benefit</b>	<b>Social Housing</b>	<b>Low Education</b>	<b>Estimated Probability</b>
0	0	0	0.07941
0	1	0	0.14359
0	0	1	0.19499
0	1	1	0.3201
1	0	0	0.40251
1	1	0	0.56699
1	0	1	0.65419
1	1	1	0.78618

Figure 5.12 ROC Curve Model 5

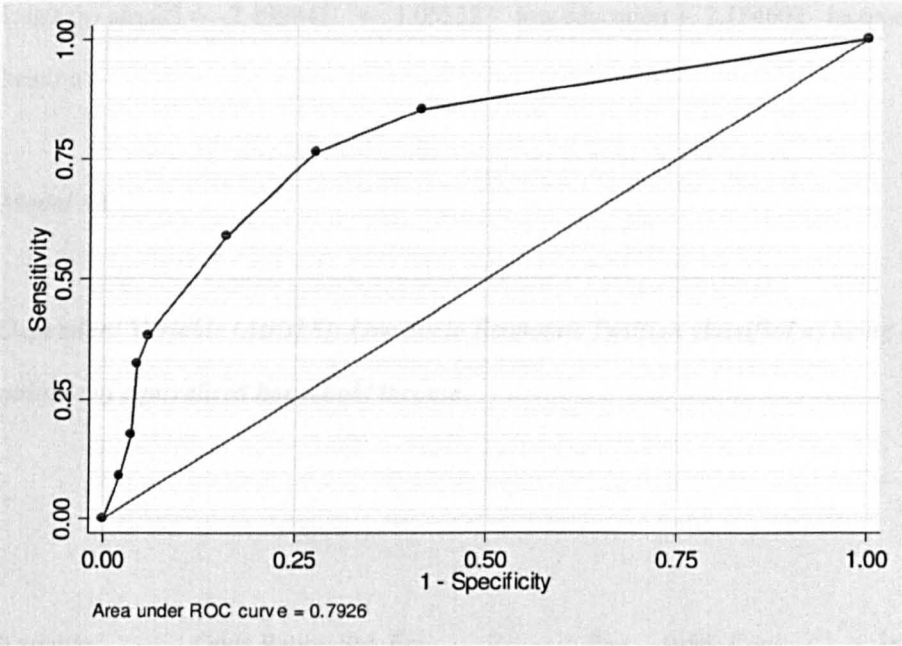


Table 5.23 Sensitivity and specificity Model 5 atrisk5

Cut Off	Sensitivity	Specificity	Overall Accuracy
0.77	8.8	97.3	80.2
0.64	17.6	96.4	80.8
0.55	32.3	95.6	85.5
0.39	38.2	94.2	83.1
0.31	58.8	84.1	79.1
0.18	76.5	72.5	73.3
0.13	85.3	58.7	63.9

A stepwise approach identified being in receipt of income benefit, problems of affordability of heating, and low education as the three explanatory variables to be included in a model for atrisk5 (Model 5A)

The logistic regression model (Model 5A) is shown below:

$$\text{Logit (p) atrisk5} = -2.495941 + 1.055327 \text{ low education} + 2.184602 \text{ income benefit} + .9113433 \text{ heating}$$

**Model 5A**

**Dependent Variable (Atrisk5): Low Socio Economic Position classified as being in NSSEC=3 and bottom quintile of equivalised household income**

Variable	Odds Ratio	Std. Err.	Z	P>z	[95% Conf. Interval]
Low education	2.872914	1.269395	2.39	0.017	1.208426 6.830074
Income benefit	8.887109	4.766794	4.07	0.000	3.10599 25.42851
heating	2.487662	1.136487	1.99	0.046	1.016062 6.090632

Number of obs = 170

Prob > chi2 = 0.0000

The logistic model shows the odds of patients on income benefit being classified as atrisk 5 are 8.9 times the odds of patients not on income benefit; the odds of patients stating that they had problems with affordability of heating housing are 2.5 times the odds of patients without problems of affordability of heating; and the odds of patients with low education are 2.9 times the odds of patients with higher education levels being classified as atrisk5. All the explanatory variables are statistically significant at the 5% level.



The value of the area in the ROC curve was 0.805 just in the good classification of accuracy. At the 0.16 cut off point the false negative rate was 15% with overall accuracy 65.9% at this cut off point.

The stepwise model is marginally stronger in terms of accuracy and reducing false negatives than the baseline model, however the number of true positives in the atrisk5 sample is 34 patients, a relatively narrow classification.

***Table 5.24 Model 5A Combination of explanatory variables***

<b>Low Education</b>	<b>Income Benefit</b>	<b>Heating</b>	<b>Estimated Probability</b>
0	0	0	0.0761432
0	0	1	0.1701453
1	0	0	0.1914503
1	0	1	0.370687
0	1	0	0.422788
0	1	1	0.6456573
1	1	0	0.6778673
1	1	1	0.8396103

Figure 5.13 ROC Model 5A

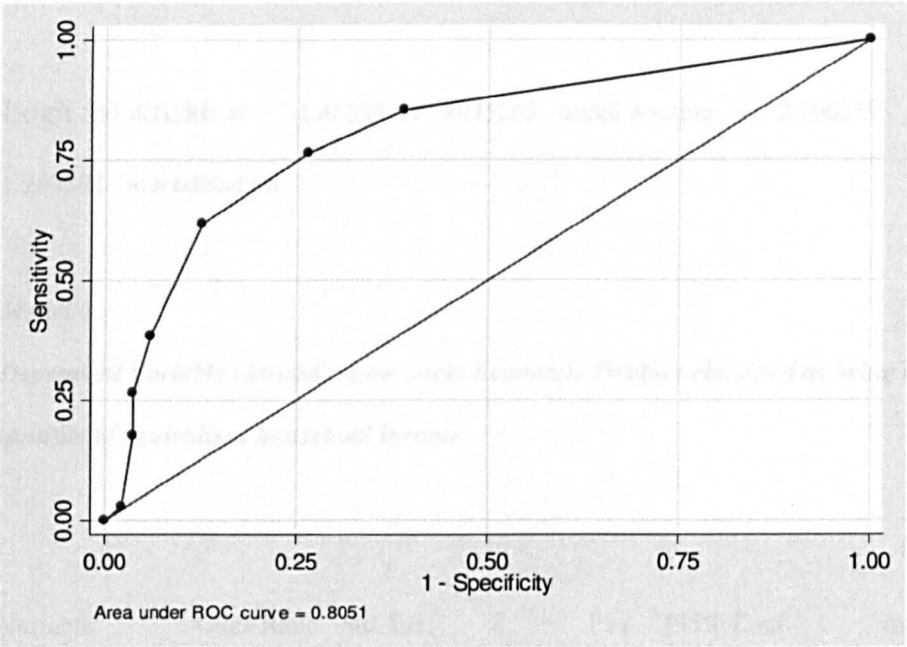


Table 5.25 Sensitivity and specificity Model5A atrisk5

Cut Off	Sensitivity	Specificity	Overall Accuracy
0.82	2.9	9.78	78.8
0.66	17.6	96.3	80.6
0.63	26.5	96.3	82.3
0.41	38.2	94.1	82.9
0.36	61.7	87.5	82.3
0.18	76.5	73.5	74.1
0.16	85.3	61.0	65.9

**Atrisk6– Lowest NSSEC or bottom quintile of equivalised household income**

Model 6 has a dependent variable of atrisk6 and three explanatory variables of social housing, low education and being in receipt of income benefit. The logistic regression is shown below:

$$\text{Logit (p) atrisk6} = -1.46034 + .4875269 \text{ social housing} + 2.106339 \text{ income benefit} + 1.269392 \text{ low education}$$

#### **Model 6**

***Dependent Variable (Atrisk6): Low Socio Economic Position classified as being in NSSEC=3 OR bottom quintile of equivalised household income***

Variable	Odds Ratio	Std. Err.	Z	P>z	[95% Conf. Interval]
Income benefit	8.2181	3.786925	4.57	0.001	3.330697 20.27719
Social housing	1.628284	.4660162	1.70	0.088	.9292139 2.853282
Low education	3.558688	1.010463	4.47	0.001	2.039847 6.208436

Number of obs = 299

Prob > chi2 = 0.0000

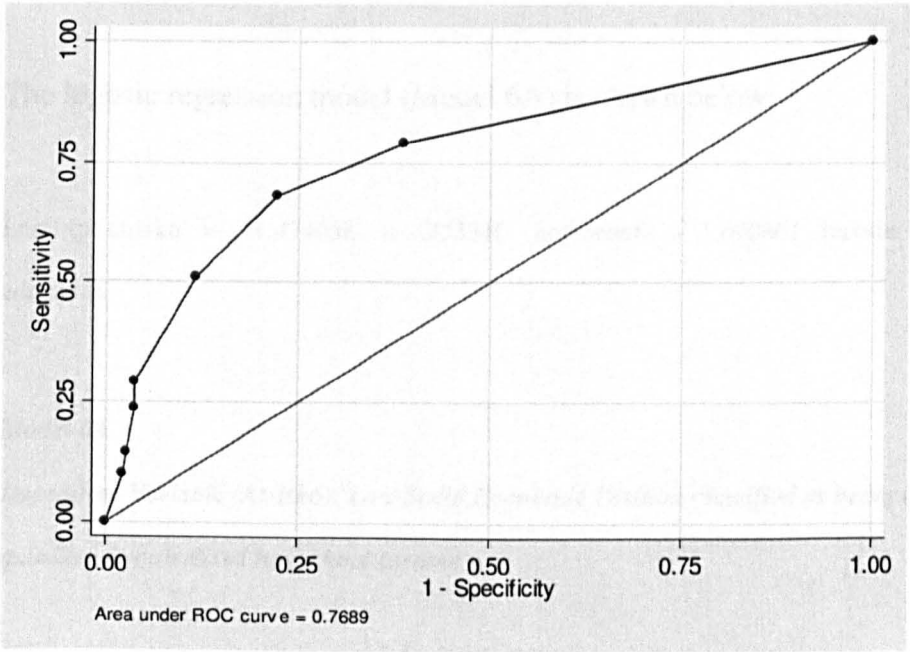
The logistic model shows the odds of patients on income benefit being classified as atrisk 6 are 8.2 times the odds of patients not on income benefit; the odds of patients living in social housing are 1.6 times the odds of patients not living in social housing; and the odds of patients with low education are 3.6 times the odds of patients not having low education being classified in atrisk6 category. Social housing (0.088) was not statistically significant at the 5% level

The ROC Curve and sensitivity and specificity were calculated based on the values shown in table 5.26.) The value of the area in the ROC curve was 0.769, below the good classification of accuracy. At the lowest cut off point the false negative rate was 21%, high relative to other models with overall accuracy at this point 67.9%.

**Table 5.26 Model 6 Combination of explanatory variables**

Income Benefit	Social Housing	Low Education	Estimated Probability
0	0	0	0.18842
0	1	0	0.27432
0	1	0	0.45241
0	1	1	0.57361
1	0	0	0.65611
1	1	0	0.75649
1	0	1	0.87162
1	1	1	0.91705

**Figure 5.14 ROC Model 6**



**Table 5.27 Sensitivity and specificity Model 6 Atrisk6**

Cut Off	Sensitivity	Specificity	Overall Accuracy
0.90	10.0	97.9	65.5
0.86	14.5	97.3	66.9
0.74	23.6	96.3	69.6
0.64	29.1	96.3	71.6
0.56	50.9	88.4	74.6
0.44	68.2	77.8	74.2
0.26	79.1	61.4	67.9

A stepwise approach identified being in receipt of income benefit, receipt of any benefit, and low education as the three explanatory variables to be included in a model for atrisk6 (Model 6A)

The logistic regression model (Model 6A) is shown below:

Logit (p) atrisk6 = -1.474658 + .753316 any benefit + 1.690861 income benefit + 1.350387 low education

#### **Model 6A**

**Dependent Variable (Atrisk6): Low Socio Economic Position classified as being in NSSEC=3 OR bottom quintile of equivalised household income**

Variable	Odds Ratio	Std. Err.	Z	P>z	[95% Conf. Interval]
Any benefit	2.26119	.7739357	2.38	0.017	1.156104 4.422595
Income benefit	5.162504	2.687907	3.15	0.002	1.860691 14.32342
Low education	3.683203	1.047663	4.58	0.000	2.109147 6.431975

Number of obs = 294

Prob > chi2 = 0.0000

The logistic model shows the odds of patients on income benefit being classified as atrisk 6 are 5.2 times the odds of patients not on income benefit; the odds of patients who receive any benefit are 2.3 times the odds of patients not in receipt of any benefit; and the odds of patients with low education are 3.7 times the odds of patients with higher education levels being classified as atrisk 6. All the explanatory variables are statistically significant at the 5% level.

Table 5.28 shows the combination of explanatory variables and their associated probabilities. The value of the area in the ROC curve was 0.770, towards the top end of the fair classification of accuracy. As in the baseline model there were relatively high false negative rates with the lowest being 23% at the 0.31 cut off point, although overall accuracy at this point was higher at 70.9%.

The two models were similar in terms of accuracy and reducing false negatives and the number of true positives in the atrisk6 sample is 110 patients, a broader classification.

**Table 5.28 Model 6A Combination of explanatory variables**

Any Benefit	Low Education	Income Benefit	Estimated Probability
0	0	0	0.18624
1	0	0	0.3271
0	1	0	0.468972
0	0	1	0.55384
1	0	1	0.65227
1	1	0	0.72502
1	1	1	0.91051

Figure 5.15 ROC curve Model 6A

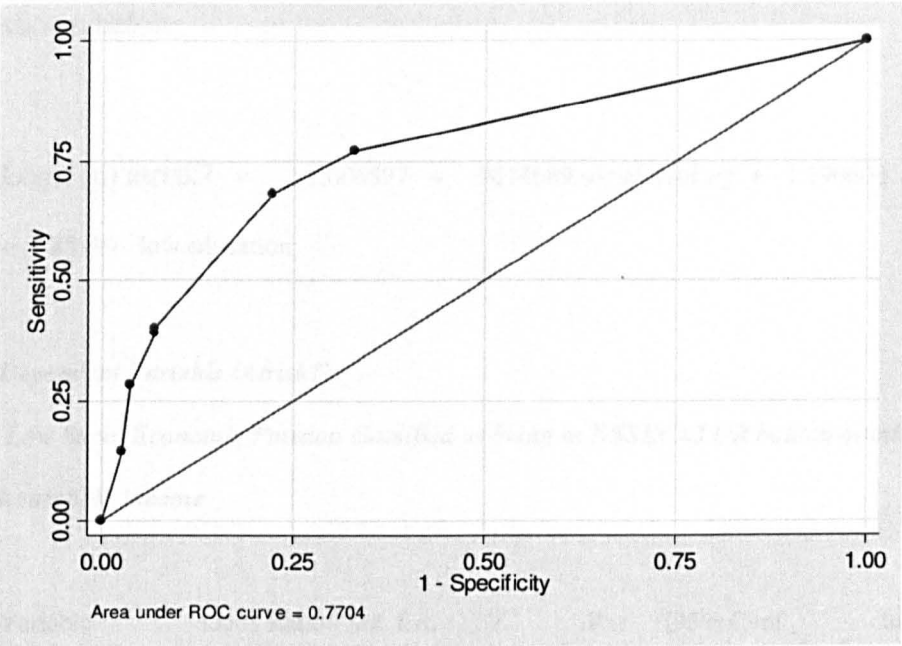


Table 5.29 Sensitivity and specificity Model 6A atrisk6

Cut Off	Sensitivity	Specificity	Overall Accuracy
0.90	14.5	97.3	66.9
0.71	28.2	96.3	71.2
0.64	39.1	93.1	72.3
0.54	40.0	93.1	73.6
0.45	68.2	77.8	74.2
0.31	77.3	67.2	70.9

**Atrisk7– Lowest NSSEC or bottom two quintiles of equivalised household income**

Model 7 has a dependent variable of atrisk7 and three explanatory variables of social housing, low education and being in receipt of income benefit. The logistic regression is shown below:

Logit (p) atrisk7 = -1.006897 + .9014689 social housing + 1.190608 income benefit  
+ 1.85999 low education

**Dependent Variable (Atrisk7)**

**Low Socio Economic Position classified as being in NSSEC=3 OR bottom quintile of equivalised household income**

Variable	Odds Ratio	Std. Err.	Z	P>z	[95% Conf. Interval]
Income benefit	6.423671	3.315386	3.60	0.001	2.335937 17.66467
Social housing	2.463219	.6856418	3.24	0.001	1.427478 4.250467
Low education	3.289082	.9334497	4.20	0.001	1.885826 5.736511

Number of obs = 299

Prob > chi2 = 0.0000

The logistic model shows the odds of patients on income benefit being classified as atrisk7 are 6.4 times the odds of patients not on income benefit; the odds of patients living in social housing are 2.5 times the odds of patients not living in social housing; and the odds of patients with low education are 3.3 times the odds of patients not having low education of being classified in atrisk7 category. All the explanatory variables are statistically significant at the 5% level.

The estimated probabilities for each possible outcome of the explanatory variables are shown in table 5.30 . The value of the area in the ROC curve was 0.755, below the good

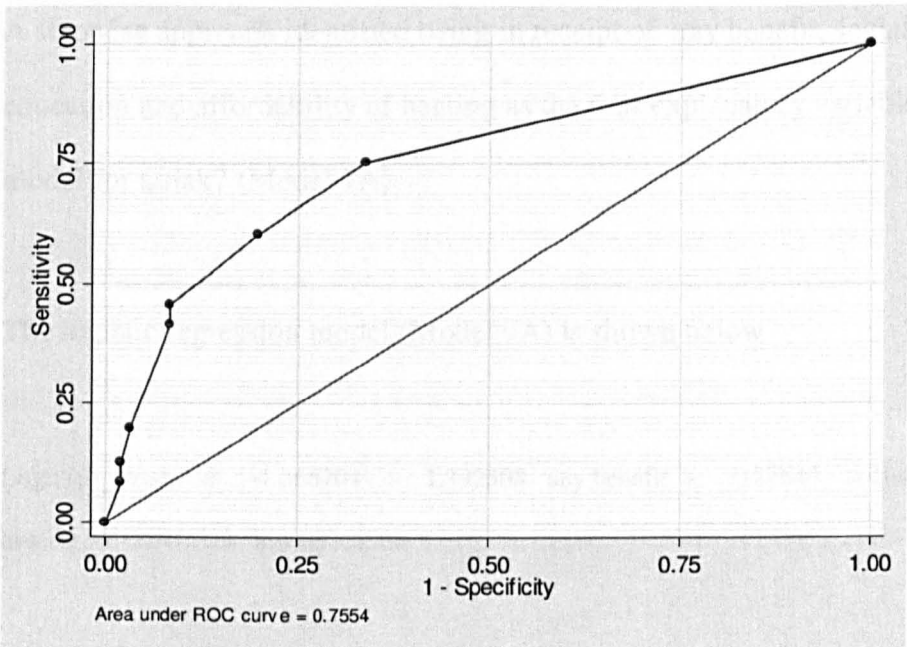


classification of accuracy. As with the atrisk6 category, the false negative rate was relatively high; at the lowest cut off point the false negative rate was 25%, high relative to other models with overall accuracy at this point 70.6%.

**Table 5.30 Model 7 Combination of explanatory variables**

Income Benefit	Social Housing	Low Education	Estimated Probability
0	0	0	0.2675876
0	1	0	0.47367
0	0	1	0.5458
1	0	0	0.70122
0	1	1	0.74747
1	1	0	0.85253
1	0	1	0.88531
1	1	1	0.95003

**Figure 5.16 ROC Curve Model 7**



**Table 5.31 Sensitivity and specificity Model 7 atrisk 7**

<b>Cut Off</b>	<b>Sensitivity</b>	<b>Specificity</b>	<b>Overall Accuracy</b>
0.94	8.45	98.1	55.5
0.87	12.7	98.1	57.5
0.84	19.7	96.8	60.2
0.73	41.5	91.7	67.9
0.69	45.8	91.7	69.9
0.53	66.6	80.2	70.9
0.46	75.3	66.2	70.6

A stepwise approach identified being in receipt of any benefit, social housing, low education and affordability of heating as the four explanatory variables to be included in a model for atrisk7 (Model 7A)

The logistic regression model (Model 7A) is shown below

$$\text{Logit (p) atrisk7} = -1.366704 + 1.392508 \text{ any benefit} + .7127643 \text{ social housing} + .7716307 \text{ heating} + 1.103625 \text{ low education}$$

***Dependent Variable (Atrisk7):***

***Low Socio Economic Position classified as being in NSSEC=3 OR bottom two quintiles of equivalised household income***

**Model 7A**

Variable	Odds Ratio	Std. Err.	Z	P>z	[95% Conf.	Interval]
Any benefit	4.024933	1.294049	4.33	0.000	2.143337	7.558349
Social housing	2.039622	.6000718	2.42	0.015	1.145829	3.630608
heating	2.163291	.6589524	2.53	0.011	1.190785	3.930035
low education	3.015076	.8909082	3.73	0.000	1.68959	5.380407

Number of obs = 294

Prob > chi2 = 0.0000

The logistic model shows the odds of patients receiving any benefit being classified as at risk 7 are 4 times the odds of patients not receiving any benefit; the odds of patients stating heating affordability being classified as at risk 7 are 2.2 times the odds of patients not stating heating affordability as an issue; the odds of patients in social housing are twice the odds of patients not in social housing; and the odds of patients with low education being classified as atrisk 7 are 3 times the odds of patients with higher education levels. All the explanatory variables are statistically significant at the 5% level.

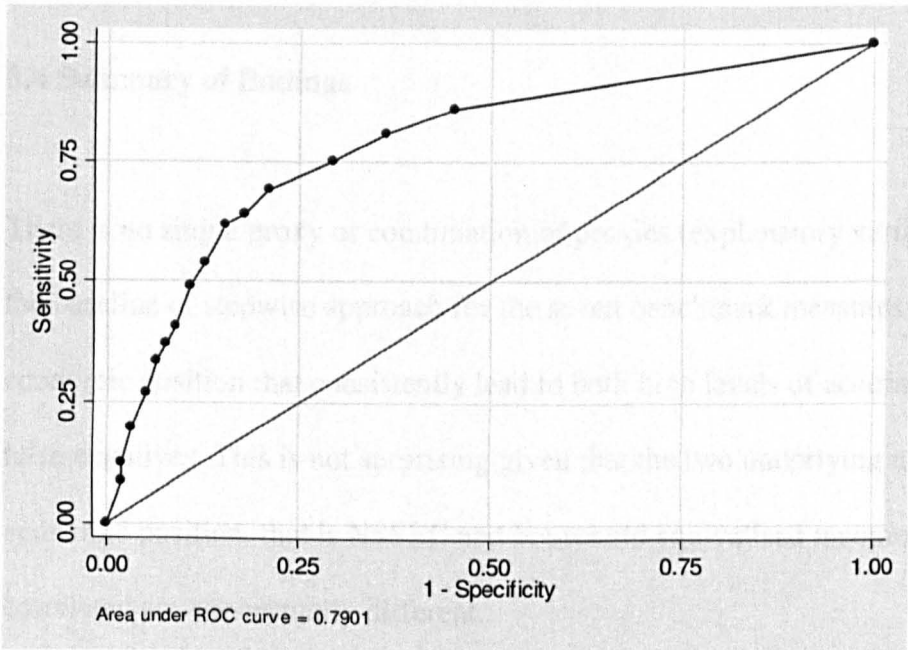
The estimated probabilities for each possible outcome of explanatory variables are shown in table 5.32. The value of the area in the ROC curve was 0.790 close to the top of the fair classification of accuracy. The two bottom cut off points (0.34 and 0.33) had relatively low false negative rates of 14% with 70% overall accuracy, providing a stronger model than the

atrisk7 baseline model in terms of accuracy in classifying atrisk7. The atrisk7 classification is the broadest of all the dependent variables in terms of the number of true positives, with 142 patients being classified as =1 of a total of 299 patients.

Table 5.32 Model 7A Combination of explanatory variables

Any Benefit	Social Housing	Heating	Low Education	Estimated Probability
0	0	0	0	0.2031528
0	0	1	0	0.3554716
0	1	0	0	0.3421022
0	0	0	1	0.4346069
1	0	0	0	0.5064507
0	1	1	0	0.5293888
0	1	0	1	0.6105644
0	0	1	1	0.6244668
1	1	0	0	0.6766827
1	0	1	0	0.6894255
1	0	0	1	0.7557335
0	1	1	1	0.772295
1	1	1	0	0.8190907
1	1	0	1	0.8632079
1	0	1	1	0.8700114
1	1	1	1	0.931746

Figure 5.17 ROC Model 7A



**Table 5.33 Sensitivity and specificity Model 7A atrisk7**

<b>Cut Off</b>	<b>Sensitivity</b>	<b>Specificity</b>	<b>Overall Accuracy</b>
0.92	8.7	98.1	56.5
0.86	19.7	96.8	60.9
0.85	19.7	96.8	60.9
0.80	27.0	94.9	63.3
0.76.	33.6	93.6	65.6
0.74	37.2	92.4	66.7
0.67	48.9	89.2	70.4
0.66	48.9	89.2	70.4
0.61	62.0	84.7	74.1
0.60	62.0	84.7	74.1
0.51	64.2	82.2	73.8
0.49	69.3	79.0	74.5
0.42	75.2	70.7	72.8
0.34	86.1	54.8	70.0

#### **5.4 Summary of findings**

There is no single proxy or combination of proxies (explanatory variables) identified by the baseline or stepwise approach for the seven benchmark measures of low socio economic position that consistently lead to both high levels of accuracy and low levels of false negatives. This is not surprising given that the two underlying measures of socio economic position, that is NSSEC and household equivalised income, while reasonably correlated are conceptually different.

There are, though, some noticeable patterns that emerge from the models identified in the earlier analysis and summarised below in table 5.34.

Being in receipt of income benefit consistently has higher odds ratios than other explanatory variables. The odds ratio for income benefit is as high as 8.89 in Model 5A and is included in twelve of the fourteen models. It also has high levels of statistical significance.

Social Housing and Low Education vary in their ranking depending on the dependent variable selected, with the occupationally based measure of NSSEC being more sensitive to low education. While all the selected models are statistically significant at the 0.05 thresholds some individual explanatory variables are not, notably in Model 4 (Being NSSEC3 and in bottom income quintile) where both low education and social housing are not statistically significant at the 0.05 threshold. Social housing is also not significant in models 2, 5 and 6.

However all of models themselves pass tests for statistical significance.



<i>Model</i>	<b>N</b>	<b>Social Housing</b>	<b>Low Education</b>	<b>Income Benefit</b>	<b>Any benefit</b>	<b>Heating</b>	<b>Prob &gt; Chi2</b>	<b>Chi 2</b>
<i>Atrisk1</i>	179	2.49 (0.015)	4.83 (0.00)	5.52 (0.006)			0.000	46.09
<i>Atrisk1A</i>	179	2.37 (0.002)	4.77 (0.00)		3.63 (0.002)		0.000	47.44
<i>Atrisk2</i>	282	1.58 (0.172)	1.89 (0.053)	7.31 (0.000)			0.000	43.81
<i>Atrisk2A</i>	288			8.24(0.000)		2.52 (0.005)	0.000	42.82
<i>Atrisk3</i>	292	2.23(0.004)	2.07(0.011)	5.86(0.000)			0.000	51.89
<i>Atrisk3A</i>	288		2.05 0.016)	2.92 (0.032)	2.97 (0.002)	3.28 (0.000)	0.000	72.70
<i>Atrisk4</i>	172	1.71(0.268)	1.45(0.443)	5.54(0.001)			0.002	14.78
<i>Atrisk4A</i>	170			6.62 (0.000)		2.86 (0.029)	0.000	17.02
<i>Atrisk5</i>	172	1.94(0.133)	2.81(0.019)	7.81(0.000)			0.000	30.90
<i>Atrisk5A</i>	170		2.88 (0.017)	8.89 (0.000)		2.49 (0.046)	0.000	32.89
<i>Atrisk 6</i>	299	1.63(0.088)	3.56(0.000)	8.22(0.000)			0.000	67.17
<i>Atrisk 6A</i>	294		3.68 (0.000)	5.16 (0.002)	2.26 (0.017)		0.000	67.68
<i>Atrisk7</i>	299	2.46(0.001)	3.29(0.000)	6.42(0.000)			0.000	67.38
<i>Atrisk 7A)</i>	294	2.04 (0.015)	3.01 (0.000)		4.02 (0.000)	2.16 (0.011)	0.000	81.06

**Table 5.34 Summary table of logistic regression models for each at risk classification**



The analysis of the logistic models provided the basis to test for diagnostic accuracy through calculating sensitivity and specificity

Table 5.35 below shows the overall accuracy as defined by the area under the ROC curve, where atrisk5 with models 5 and 5A had the highest values (0.793 and 0.805) with relatively small false negative rates (14.7%). However at the relevant cut off points overall accuracy was only 63.9 and 65.9. In addition, the benchmarks that include either benchmark would lead to smaller numbers of patients as being classified as being at risk.

Models with higher numbers of patients being able to be classified would fall into the atrisk6 and atrisk7 categories which include patients either in NSSEC3 or low equivalised income. Models 6 and 6A have poor overall accuracy and relatively high false negative rates (20.9 and 22.7), however model 7A had the lowest false negative rate of 13.9% with accuracy at this cut off point of 70.9%. Sensitivity was high 86.1%, but specificity low 54.8% indicating the trade off between reducing false negatives but increasing false positives.

**Table 5.35 Summary table of logistic regression results for each at risk classification at estimated probability cut off point that gives lowest false**

**negative** (excluding position where all patients are targeted)

Model	N	ROC area	Lowest False Neg Rate (%)	Sensitivity(%)	Specificity(%)	Accuracy at probability cut off point (%)
1	179	.781	24.7	75.3	67.9	70.9
1A	179	.778	21.9	78.1	61.3	68.2
2	292	.757	14.8	85.2	54.6	61.0
2A	288	.730	32.2	67.8	71.2	70.5
3	292	.737	21.4	78.6	59.8	66.4
3A	288	.794	11.9	88.1	58.8	69.1
4	172	.732	16.7	83.3	55.1	59.3
4A	170	.756	25.0	75.0	72.6	72.9
5	172	.793	14.7	85.3	58.7	63.9
5A	170	.805	14.7	85.3	61.0	65.9
6	299	.769	20.9	79.1	61.4	67.9
6A	294	.770	22.7	77.3	67.2	70.9
7	299	.755	24.7	75.3	66.2	70.6
7A	294	.790	13.9	86.1	54.8	70.0



The accuracy and ability to reduce false negatives across the different models varied significantly and a set of criteria is needed to provide a base for making judgements as to what model may be used in the practical setting of primary care.

Further, with resource constraints and different local objectives, it is unlikely that any single simple rule to minimise false negatives would not be appropriate.

### **5.5 Targeting a population – the practical issue of selecting a model**

The choice of at risk classification will decide the target population. This decision can lead to different proportions of the population defined as being in low socio economic position. There are several observations that can be made about the target population identified by the different atrisk classifications.

#### **i) Being classified into one of the benchmarks,**

This could include for example, being classified as atrisk1 (being in NSSEC3) or atrisk2 or 3 (being classified in the bottom or bottom two income quintiles). The NSSEC measure classified 41% of patients as being in a low socio economic position. This compared to 21% and 37% of patients being classified as being in a low socio economic position by the income benchmarks. The NSSEC sample was smaller due to higher 'missing' classifications (see Chapter 4).

#### **ii) Being classified as being in both benchmarks,**

This would include atrisk4 and 5 classify patients to low socio economic position when they fall into both NSSEC3 and low income. With the lowest income quintile as the measure of low socio economic position, 14% were identified as being in low socio economic position and with the bottom two income quintile measure 20% of patients

were identified as being in low socio economic position. These benchmarks are the narrowest in classifying patients to low socio economic position.

### **iii) Being classified as being in either benchmark**

This would include atrisk6 and 7 classify patients if they are either NSSEC 3 or low income. This broader definition of low socio economic position identifies 37% or 47% of patients as being in low socio economic position depending on the income quintiles selected. These are the broadest and most inclusive classifications.

A decision to target a larger section of the population would move towards measures such as atrisk7 or atrisk1 (bottom two income quintiles or NSSEC3), whereas a decision to target a small section of the population would tend towards atrisk2 (bottom income quintile) and atrisk4 and 5 (being both NSSEC3 and in lower income quintiles). Such decisions will have resource implications.

There are though, other important considerations.

First, the discussion above is based on potential for targeting patients in a low socio economic position. It does not take into account individual associations between proxy and benchmark variables and health outcomes. This latter consideration can be an important part of the decision making process. A particular GP practice may wish to target a particular medical condition for patients in low socioeconomic positions, and so wish to select a particular explanatory variable. This method allows for such flexibility.

Second, the discussion so far also ignores a more technical problem of the difference between a potential target population, and the ability to identify that target population accurately in a cost effective way. It is possible, that an at risk category that has a high proportion of patients in low socioeconomic positions may not have the highest proportion of patients accurately classified by the relevant model. If the ' best' model for that benchmark has low levels of accuracy, then in order to capture sufficient true positives (that is the patients in a low socioeconomic position) a large population has to be targeted which will include a high number of false positives.

It is therefore important to consider both the potential number of patients in a low socioeconomic position (true positives), as well as the actual number accurately classified by the models. The following discussion examines three different selection criteria that can be used as a framework for considering this. The discussion of each criterion will inevitably refer to the other two; for example reducing false negatives affects both overall accuracy and resource.

The following provides alternative criteria for selecting a model which can form the basis for making decisions on how to classify and thus select patients by socio economic position:

- 1) A focus on reducing false negatives;
- 2) A focus on higher overall accuracy rates;
- 3) A focus on resource available.

## Reducing false negatives

Table 5.35 showed rates of false negatives in the different models. Table 5.36 repeats this information at the cut off point of where false negatives are lowest (excluding the extreme position of including all patients and thus having 0 false negatives).

It also adds two additional columns.

The third column shows the proportion of the total population that the model classifies as being in a low socio economic position. If applied for targeting patients, these would be the patients who would be actively targeted. This group will include true positives and false positive, that is, patients who have been correctly classified as being in a low socio economic position, who are in fact not in a low socio economic position. So for example, in relation to Model 1, at the selected cut off point where false negatives are lowest, the model classifies 49.7% of the total population as being in a low socio economic. The implications of this will be discussed shortly.

The other additional column is column five. It shows the proportion of the total population classified by the model as being in a low socio economic position who are true positives. This can be compared to column three that shows the proportion of the total population that is actually in a low socio economic position by each at risk category (the true positives of the whole population). So in the case of Model 1, 30.9% percentage points of the possible 41% of the total population who are in a low socioeconomic position have been correctly classified by Model 1..

The at risk categories with the highest proportions of patients classified as being in low socio economic position (atrisk7 and atrisk1) do not have significantly lower overall

accuracy levels, in fact they were among the most accurate models at the cut off point selected to reduce false negatives. However, while atrisk7 (Model 7A) has the lowest false negative rate, the true positive rate of only 54.8% illustrates the trade off between correctly classifying patients who are in low socioeconomic positions and correctly identifying those who are not.

The implications of this are that 64% (column 3) of the total population would be targeted to accurately classify 40% of the total population who are in a low socioeconomic position (of a possible 47%). There would be a minority of patients who are in a low socioeconomic position who will be missed (false negatives), but also a significant number of false positives – patients who are identified as being low socioeconomic position, but are in fact not. This would be a very resource intensive approach to targeting. The overall accuracy of model 7A was 70%, only 2.9 percentage points lower than the highest overall accuracy model in the table – the main inaccuracies in classification being false positives.

A similar analysis of the second most inclusive classification for low socioeconomic position (atrisk1) shows a smaller proportion of the total population needs to be included to identify around 30% of patients who are in a low socioeconomic position.

Both of the above examples illustrate the fact that reducing false negatives to the levels outlined in Table 5.36 would involve targeting 50% or more of the total population.

Taking a narrow classification such as atrisk4, to achieve the lowest false negative rate of 16.7% (model 4) 52.3% of the total population would be targeted. This would include 11.7% percentage points of true positives out of a possible 14% of true positives. However, in this case a narrower classification would not lead to smaller population needing to be targeted, due to high levels of false positives. The second strongest model in terms of



reducing false negatives for this narrowest classification, Model 4A, required 37.2% of the total population to be targeted.

**Table 5.36 Summary table of models of at risk classifications and measures of accuracy at lowest false negative cut off<sup>4</sup>**

<b>Mode</b>	<b>N</b>	<b>% of total population classified by model as being in low socio economic position</b>	<b>Actual % of population in low socio economic positions</b>	<b>% of population accurately classified as in a low socioeconomic position</b>	<b>Lowest false negative rate (%)</b>	<b>Sensit ivity (%)</b>	<b>Specificity (%)</b>	<b>Overall accuracy at cut off point (%)</b>
1	179	49.7	41	30.9	24.7	75.3	67.9	70.9
1A	179	54.7	41	32.0	21.9	78.1	61.3	68.2
2	292	53.8	21	17.9	14.8	85.2	54.6	61.0
2A	288	43.8	21	14.2	32.2	67.8	71.2	70.5
3	292	53.8	35	27.5	21.4	78.6	59.8	66.4
3A	288	57.9	35	30.8	11.9	88.1	58.8	69.1
4	172	52.3	14	11.7	16.7	83.3	55.1	59.3
4A	170	37.2	14	10.5	25.0	75.0	72.6	72.9
5	172	50	20	17.0	14.7	85.3	58.7	63.9
5A	170	48.3	20	17.0	14.7	85.3	61.0	65.9
6	299	53.6	37	29.3	20.9	79.1	61.4	67.9
6A	294	49.2	37	28.6	22.7	77.3	67.2	70.9
7	299	53.6	47	35.4	24.7	75.3	66.2	70.6
7A	294	64.2	47	40.4	13.9	86.1	54.8	70.0

<sup>4</sup> Excluding position where all patients are classified and therefore have 0% false negatives

While the aim of reducing false negatives is important for a policy that wishes to target socio economic disadvantage, the resource implications for many of the models are significant. By including false positives, the resources are also being targeted at patients who would not naturally fall into a vertically equitable healthcare approach.

### **Focus on higher overall accuracy**

An alternative criterion for selecting a model is one based on selecting the combination of explanatory variables for each model that has the best overall accuracy.

Depending on the at risk category, and model selected, this would lead to lower levels of the population needing to be targeted with fewer levels of false positives. It would therefore require fewer resource. Table 5.37 below shows the results for the atrisk categories and each model, along with levels of sensitivity and specificity.

The models with the highest accuracy were the narrowest classifications (atrisk4 and 5) with overall accuracy of 82.9% and 86.1%. However, these tended to be far better at identifying true negatives than true positives, with specificity tending to be over 90% and sensitivity as low as 25% (Model 4). The highest true positive rate of these narrow benchmarks was 38.2% (model 5A). These narrow models were therefore not effective at correctly identifying patients in a low socio economic position when focusing on higher overall accuracy. This can be seen with Model 4, which picks up only 3.5% of the total population as low socioeconomic position as compared to the true total of 14%. However, this would require quite small numbers of patients to be targeted, as low as 8.7% of the population with Model 4.

Given that the aim of the research is to enable more effective targeting, such high levels of false negatives would prove ineffective in identifying patients in low socio economic positions if the most accurate model approach was adopted.

Atrisk1 (NSSEC3) and atrisk2 and 3 (income) range from as high as 82.3% overall accuracy with models 2 and 2A to 71.9% accuracy with model 3A. While the atrisk2 models achieved high levels of accuracy, they were again far better at identifying true negatives than true positives with sensitivity being 34.4% and 38.9% respectively.

Models 1 and 6A show it is possible to identify just under 70% of patients who are in a low socio economic position if just 40% of the population is targeted. While this would be resource intensive, both of these classification have higher proportions of low socioeconomic patients to target (atrisk1 has 41% and atrisk6, 37%). In these two cases Model 1 would correctly identify 27.5% of the total population in a low socio economic position, compared to the real total of 41%. Model 6A classifies 25.2% of the total population, compared to a possible 37% of the total population who are in a low socioeconomic position.

**Table 5.37 Summary table of models of at risk classifications with highest accuracy levels cut off points**

<b>Model</b>	<b>Overall Accuracy (%)</b>	<b>% of total population classified by model as being in low socio economic position</b>	<b>Actual % of population in low socio economic positions</b>	<b>% of population accurately classified as in a low socio economic position</b>	<b>Sensitivity</b>	<b>specificity</b>
1	77.1	36.9	41	27.5	67.1	84.0
1A	76.5	25.1	41	21.9	53.4	94.4
2	82.3	11.3	21	7.2	34.4	94.8
2A	82.3	13.4	21	8.2	38.9	93.4
3	71.9	13.0	35	7.4	21.1	95.2
3A	74.3	38.0	35	20.1	57.4	83.4
4	86.1	8.7	14	3.5	25.0	95.9
4A	84.1	13.9	14	5.25	37.5	91.8
5	85.5	9.9	20	6.46	32.3	95.6
5A	82.9	12.2	20	7.6	38.2	94.1
6	74.6	26.1	37	18.8	50.9	88.4
6A	74.2	39.1	37	25.2	68.2	77.8
7	70.9	53.5	47	31.3	66.6	80.2
7A	74.1	43.8	47	29.1	62.0	84.7

## **Focus on resource**

A third criterion for selecting a model is to decide what proportion of the population should be targeted and then to use that as a constraint, selecting the model that either has highest overall accuracy or lowest false negatives within that constraint.

Tables 5.36 and 5.37 illustrate this, although a series of tables could be produced with different sensitivity and specificity. If there was resource for 30% of the population to be targeted, none of the lowest false negative models outlined in Table 5.36 could be selected. However, nine of the models in Table 5.37 have lower than 30% of the population being targeted with different levels of sensitivity and specificity.

If there was sufficient resource to target 50% of the population then several models would reach around 70-75% of true positives including atrisk1 (75%), Atrisk 2 (68%) or 85% if model 2A were used with 53% of the population, and 77% of the broader atrisk6 classification.

## **5.6 Conclusion**

There were several key dimensions to the method of identifying the socio economic position of patients in this thesis:

Two benchmarks were identified that could be used in different ways to define low socio economic position. Chapter 2 discussed the fact that there are multiple meanings to what is understood by socio economic, but NSSEC and Equivalised Household

Income were chosen because of their conceptual and empirical strength in their association to health outcomes. This provides a strong basis for use in relation to targeting healthcare.

This chapter has presented alternative models to predict low socio economic position with an emphasis on measuring accuracy of classification. It has adapted the use of sensitivity and specificity analysis used in clinical trials to this setting, to provide an original framework in which patients can be targeted.

There is no single criterion that can be adopted to decide which model should be used, but three alternatives have been suggested that could be applied to the practical setting of a GP practice within the constraint of resource allocation.

While concerns of accuracy are of utmost importance for this method to have a practical outcome, patients need to understand and find acceptable the questions and uses of the approach outlined. Chapter 6 explores patients views.

## **Chapter 6 Patients' perspectives on acceptability**

### **6.1 Introduction**

Previous chapters have established a series of models to classify patients to a low socio economic position. Given the practical possibilities of the research to form a basis for a vertical equity approach to health care, it is also important to consider perspectives of patients. The views of selected NHS professionals are explored in Chapter 7.

This chapter analyses the responses made by 306 patients to questions related to the acceptability of the approach to primary care outlined in this research. It will show that questions on 'acceptability' can be interpreted in different ways. Patients were confident in expressing their views, and at times demonstrated a complex level of reflection and understanding that directly relates to issues of equity, the key interest of this research.

It will be demonstrated that there are generally high levels of acceptance in the sample population supported by responses from a simple Likert scale question. However, the more qualitative analysis of open-ended comments shows that such acceptability is conditional. Patients sought to actively engage in the types of healthcare they receive, seeking information, justifications and asking questions about the approach suggested. There were important reservations expressed around the link between socio economic conditions, health and healthcare, and suspicion over how information collected would be used.



There was also a high level of trust displayed by patients of the health care professionals with whom they come into contact in the GP setting, and a sense of compliance with what the system asks of them. The chapter starts by briefly providing an overview of the method of the chapter, before reporting the findings of the fixed response questions and open ended comments.

## **6.2 Method**

Chapter 3 provides a fuller description of the methods undertaken in the research, but some specific points are presented here as a reminder and to focus specifically on this chapter's findings.

The relevant section of the questionnaire for this chapter is shown in Appendix 1. Patients were asked their views on the acceptability of individual questions, and on their ease of understanding of the wording of the questions. In addition, they were asked whether they would find it acceptable overall to be asked such questions when registering at a GP surgery, with three possible responses, acceptable, unacceptable and unsure. Analysis of the responses to these questions will consider overall responses, but also analyse any differences between the responses of patients from different socio economic positions.

A similar analysis will be shown for the individual questions that were used for both the benchmark variables (NSSEC and Income) and also the proxy explanatory variables.

This is followed by an analysis of the open ended comments at the end of the questionnaire. In exploring the open-ended comments a fuller discussion of the meaning of acceptability will be given followed by a more detailed exploration of different aspects of acceptability.

Adopting a mixed quantitative and qualitative approach allows for triangulation to validate the research outcomes. However, as explained in Chapter 3 the primary purpose of using mixed methods in this research is not for triangulation, but to allow for more flexible, richer and deeper analysis (Milburn et al 1995).

Responses may have been influenced by several factors such as interview bias or self selection which may result in research bias (see Chapter 3 for fuller discussion).

### **6.3 Findings – Fixed responses**

This section will examine the fixed responses to the questions in the questionnaire reproduced in Appendix 1. When reporting p values, the stated result is always given at the 0.05 cut off threshold as explained in Chapter 3.

The initial findings of the fixed response question allow for a more quantitative interpretation of patient views on acceptability.

The following question was asked about overall acceptability

***Overall would you find it acceptable to be asked these sort of questions when registering as a patient at the Practice?***

Acceptable to ask ☐    Unacceptable ☐    Unsure ☐

There was a 100% completion of this question with the majority of patients stating they would find the questions asked acceptable (70%), and a minority stating they were unacceptable (17%)

**Table 6.1 Overall acceptability of questions**

	Number	Percent
Acceptable	215	70
Not acceptable	51	17
Unsure	40	13
Total	306	100

There are important factors that may have affected this overall view on acceptability. The question specifically asked about 'these sorts of questions' and further analysis of individual socio economic questions showed mixed responses on how acceptable individual questions were.

Analysis of overall acceptability by both gender and age group was inconclusive and found the differences on these variables were not to be statistically significant.

Differences in levels of acceptability between patients from different socio economic backgrounds, based on the two benchmark variables of NSSEC and household income were also explored.

There were some small differences in views on acceptability between socio economic groups; however the association was outside the statistical significance level of  $p = 0.05$  as explained below.

Table 6.2 shows 71% of patients identified as NSSEC3 compared to 72% of patients not NSSEC3 responded that the questions were acceptable overall. However, 15 patients (21%) identified as NSSEC3 of the 179 sample stated that the questions were unacceptable compared to 11% of patients in NSSEC1&2 . Patients who were classified as being in NSSEC1&2 were thus more likely to be unsure about overall

acceptability: 17% as compared to 8% in the NSSEC3 category. The p value of 0.086 just falls outside the 0.05 significance level. There is thus limited evidence of NSSEC influencing views on overall acceptability, with NSSEC3 being marginally more likely to find the approach unacceptable, but NSSEC1&2 being more likely to be unsure.

**Table 6.2 NSSEC and overall acceptability**

	Overall acceptability			Total
	1	2	3	
NSSEC1&2	76	12	18	106
	71.70	11.32	16.98	100.00
	59.38	44.44	75.00	59.22
NSSEC3	52	15	6	73
	71.23	20.55	8.22	100.00
	40.63	55.56	25.00	40.78
<b>Total</b>	128	27	24	179
	71.51	15.08	13.41	100.00
	100.00	100.00	100.00	100.00

Pearson chi2(2) = 4.9166 Pr = 0.086

Key 1 - acceptable 2 - unacceptable 3 - unsure

When considering the income benchmark, higher income patients were more likely to state that the questions were unacceptable (17%) than patients from the bottom income quintile (13%). Patients who were identified as being in the bottom quintile of household income had higher levels of acceptance (77%) than patients from higher household income quintiles (69%). However the p value of 0.488 means these differences are not significant at 0.05 level

There was slightly less difference in acceptability between the bottom two income quintile groups (atrisk3) and the higher household income quintiles. For both atrisk categories relating to income, patients from lower socio economic positions were less likely to find the overall approach unacceptable. Moving from the bottom quintile to bottom two quintiles appeared not to affect the views in a significant way. The differences were not significant with a p value of 0.351.

Over all around 30% of patients felt the questions were either unacceptable or were unsure (see table 6.1) raising important questions for practical applications of using some questions.

One possible explanation for patients' stating that the approach was unacceptable or unsure is a concern over the inclusion in the questionnaire of a question relating to income, an issue raised in the open ended comments (see section 6.4).

Differences in responses to the income question by socio economic position were found to be statistically insignificant at the  $p=0.05$  level for both NSSEC and income benchmarks. In both cases there appeared to be little difference in acceptance of the income question between lower and higher socio economic groups. However, overall, the acceptability of the income question would appear problematic compared to other questions.

.Table 6.3 shows responses to all the questions relating to the benchmarks and the proxies.

**Table 6.3 Acceptability by different socio economic indicators (%)**

Question	Acceptable	Unacceptable	Unsure
Housing	91	3	6
Education	96	1	3
Work	96	2	2
Income	84	9	7
Benefits	93	4	3

While there were higher levels of acceptability with regard to individual responses to individual different socio economic questions asked in the questionnaire as compared to overall acceptability, there was a notable exception in the case of the income question, with 84% saying the income question was acceptable, 9% saying it was unacceptable and 7% unsure.

The difference between levels of acceptability on individual questions and overall acceptability as shown in table 6.1 can be explained in different ways.

First, there may be cumulative effects of situations where individuals who find different individual questions unacceptable or are unsure about them then translate this response to overall unacceptability.

Second, if the income question was regarded as either particularly unacceptable or unsure, then worries about being asked for income might lead these respondents to state that overall acceptability was unacceptable or they were unsure.

Finally the overall acceptability question was formulated in such a way that it was linked to registration. Open ended comments (see later) raised questions about how the data would be used, issues of confidentiality (e.g. income) and who would be seeing the information. Taken together such issues are likely to lead to uncertainty on the responses and affect overall acceptability.

These issues surrounding these responses are explored in the next section when analysing the open responses

#### **6.4 Open ended responses**

Of the 306 patients sampled 243 made a comment and 63 stated they had no comments. The high proportion of patients who made a comment is indicative of a feeling that came across in the interviews that patients felt that the NHS was both important to their lives and that they felt had a viewpoint to put forward.

Among the 'no comment' category, 32 patients had an NSSEC assigned to them, of whom 17 (53%) were classified as NSSEC3 compared to 15 (47%) patients being NSSEC1&2.

Of the 63 no comments, 58 patients had an income benchmark classified: 17 (29%) patients were in the bottom quintile and 26 (45%) were classified as being in the bottom two income quintiles.



The proportion of people classified as in low socio economic position in the NSSEC classified sample was 41%; by the income benchmark 21% were classified as in the bottom quintile and 35% as being in the bottom two quintiles. Thus patients classified as being in a low socio economic position were disproportionately included in the 'no comment' category.

As explained earlier, acceptability can be interpreted in different ways, and five key themes emerged from exploration of the comments:

- 1) The link between socio economic factors and health outcomes
- 2) Income and health outcomes
- 3) Healthcare targeting
- 4) Privacy and confidentiality
- 5) Dialogue and seeking information.

The literature on acceptability usually relates it to some extent to the expectations of patients, and how close these expectations are to the expectations of the practitioners with whom they come into contact. Hausmann-Muela et al (2003) explain acceptability as the extent to which there is a gap between expectations of patients or users of the health system and the expectations of the health care system itself.

Marcinowicz et al (2008) simply state acceptability is a feature of a system that is in line with:

“....the wishes, desires and expectations of patients and responsible members of their families”

Within this broad definition there are a multitude of factors that contribute to acceptability, including accessibility, the practitioner-patient relationship, the amenities of care, patients’ preferences, patients’ perceptions of fairness, and views on quality and legitimacy (see Ludmila, Marcinowicz, Konstantynowicz, Slawomir, Chlanic (2008).

Some of these commonly cited dimensions of acceptability emerged in the patients’ comments concerning this approach to identifying a patient’s socio economic position. However there were additional insights into key aspect around the meaning of equity in health and healthcare

These insights are now discussed under the first three themes (above) of social determinants of health, income and health, and healthcare targeting. Following discussion of these themes, the two other themes are discussed; privacy and confidentiality and dialogue.

When showing comments, the respondent’s socio economic classification is shown by the patient’s ‘at risk’ classification:

*Atrisk 1 - NSSEC3*

*Atrisk 2 – bottom income quintile*

*Atrisk 3 - bottom two income quintiles*

If a patient is not classified as in a low socio economic position then there is no classification indicated.

### **Social determinants of health**

The emphasis in this research on the role social and economic factors play in determining health outcomes is motivated by the centrality of the link in discussions of equity in health and healthcare ( see Chapter 2)

In total, 48 patients made a comment that related to the relevance of social and economic determinants of health of which 22 of patients were in the bottom two income quintiles and 12 in NSSEC(3).

There were general comments that showed an understanding of social and economic determinants of health, with views clearly expressing interpretations not only of the relevance of the approach, but also expressing a general acceptance of the approach.

*I can understand how the information would be useful. (atrisk 2,3)*

*We are such a mixed multitude and we have difficulty in understanding things around them, and this helps them understand.*

*I suppose acceptable if you thought they were getting an idea of the populace in the area so they can target resources. (atrisk 1,2,3)*

*It makes sense to ask these sorts of questions - it gives you some kind of idea what kind of health challenges people might face.*

*From what I understand from the explanation, you are saying people who have lower incomes have less health, which makes perfect sense to me*

*I would have thought of the reason why you are asking me. I think they are probably useful, people knowing a bit about your background, can figure you out properly. It's fine by me. (atrisk 3)*

*I am fine with them as I can see the health link. (atrisk 2,3)*

*No. What will I say? This is to help prevent problems in my future. ( atrisk 3)*

One patient linked the need for more information on patients' backgrounds as helping doctors and nurses who have less time to meet their patients

*I think it's a great incentive to have this if it is part of having a holistic approach to patients but (doctors, nurses brilliant) given the time is being shortened that they have to spent with patients I don't know if it is going to work. Especially in poor areas. I think there is a lack of knowledge about patients - knowing about them can help. It isn't about the doctors but a lack of time. A lot of the time it is not about the illness but the questions you are asking - homelessness or so on.*

However, there were also comments that challenged the premise of social and economic determinants of health, or expressed confusion as to why such questions might relate to healthcare

*Are we going get anything worthwhile out of it? Statistically useful but not being linked to quality of health care to issues such as health insurance or perceptions of own health.*

*I was expecting something about the health service.....*

*I don't understand how they would help patients. (atrisk 1,2,3)*

*Questions about my lifestyle are irrelevant. (atrisk 1)*

*I don't see the relevance. (atrisk 1)*

*I don't understand the link. Puts me off being asked about income - don't expect it.(atrisk 1, 3)*

*I'm not sure how it relates to health.*

*I don't understand what they have to do with medical service.*

*You can't understand much of these people's lives through these questions. If this is done to improve the health services, I don't think this will help much.*

There was also a sense of compliance, where some patients had some doubts, but would go along with answering the questions anyway

*Acceptable if you have to ask but I don't know how relevant it is to the doctors.*

*What do they learn from it - my social background?*

The main specific areas raised related to housing, religion, ethnicity and income.

While only 3% of respondents in the fixed responses saw the question on housing as being unacceptable and 6% being unsure there were a range of comments on the housing question.

There were different concerns expressed about the housing question. Some queried the nature of the question on tenure.

*I think it is not relevant with housing, you are not asking about damp or whether I have heating. (atrisk 3)*

*Housing - sometimes people are temporary. Not all questions relevant and when you are in pain may not have the patience to answer - I have because of the background. (atrisk 3)*

Others though expressed a more general belief that the housing question was irrelevant and wondered why they would be asked about housing.

*The housing environment makes sense, but to need to elaborate on it, have more so there is a bridge so someone can understand where it is going. (atrisk1,3)*

*Acceptable to a degree - i.e. the parts I said were irrelevant to the research were housing.*

*Some of them like housing I would be wondering why they want to know but family I don't mind.*

*I don't understand why I was being asked about housing*

*Accommodation - live with parents who own. I don't how relevant they will end up being. As a student living at home I don't think they are relevant to me - it is not my house or income. Benefits - "how do you support yourself" - don't see the relevance.*

*Accommodation - shared ownership. Number of rooms - refused to answer. Room/how many unnecessary.*

Religion and ethnicity was also commented on, showing a concern about how these are related to health and so the relevance. Within these comments there may be evidence of some fear or concern that a patient's religion or ethnicity may affect the healthcare they receive. These matters were seen as private and not of concern for the health system

*I might object to the question on ethnic background because I don't see what it has to do with healthcare.....*

*I didn't see the point of the religion one, because I am not religious. (atrisk 1)*

*What I find strange is the religion... I have no objections but why is it asked? More of an observation, nothing negative. (atrisk 1&3)*



*Anything relating to ethnicity or race I feel prejudiced. Income is no one else's business.*

*Not the practice's business. Religion may be because religions have certain beliefs. (atrisk1)*

*Not asked what I think about religion and ethnicity and those are the areas would rather not answer - why would you want to know. Between me and the guy upstairs. (atrisk 2&3)*

## **Income**

Some of the strongest and most forceful comments were around the question on income. This was expressed in different ways. First, discussed here, a feeling that income had little to do with a person's health. This is of particular interest given that income is one of the two benchmark indicators of socio economic position in this research. An approach to healthcare that is based on vertical equity has embedded within it a link between health outcomes and socio economic conditions. A second set of comments relate more directly to healthcare. These are discussed in the next section.

There were 53 patients who specifically mentioned income or a related term (e.g. pay, earnings), of which 12 were NSSEC3 and 19 were classified as being in the bottom

two income quintiles. The responses either stated that income was an unacceptable question to ask, or asking / questioning the relevance of knowing about income

Some shown here, question the relevance of income to health, much as the earlier comments on housing had done. However, others, that will be discussed later related more to policy and concepts of equity.

*I don't really know why salary is relevant. (atrisk1)*

*I am not sure about income. I don't know if I might mind about my job. If it is explained why it was important and I thought that it was a good reason then I would find it acceptable. Otherwise then it's a bit intrusive. (NSSEC3 atrisk2,3)*

*.... but working and income is not really part of this. (atrisk3)*

*I would be interested to know why you need to know the income of a person - to what it relates. (atrisk3)*

*Health has no relation to income, etc. A bit too personal (atrisk3)*

*Some of them are acceptable, income would not have any effect... (atrisk3)*

*Not sure where you live or your household income has anything to do with your medical. (NSSEC3, atrisk2,3)*

*Not much to do with health and income - I'm not sure I'd answer. (NSSEC3)*

*What is the reason for asking about income?*

*I don't think questions about pay/income are relevant.*

*It's just the household and combined income of the household I don't see how it would be relevant.*

*I don't understand the link. Puts me off being asked about income - don't expect it.*

The above comments can be interpreted in different ways given the overall levels of acceptance indicated earlier in this chapter. First, some patients while expressing concerns about income and the link to health would still comply with being asked such questions. Second, there may be an understanding of the link to health, but income is such a sensitive and private piece of information that this becomes a negative response. The section on privacy and confidentiality supports the view that patients are concerned about sensitive information being passed on. Third, as shown in the next section, patients may see a link, but are concerned that this will be used in a way that they do not agree with. Finally, it is also possible that these patients really believe that income is not relevant to health.

## Healthcare targeting

There were 20 comments that questioned the relevance of such questions to the healthcare that a patient may receive.

Comments made can be directly linked to interpretations of equity. Some clearly thought that such an approach might lead to the targeting of resources towards certain patients

There were clear statements that would appear to support a view of horizontal equity. These were formulated in such a way as to argue that patients' socio economic background should not have a bearing on the healthcare they receive.

*The health service should be everyone. Doctors are there to treat my illness....*

*If someone asked "What do you earn?" - What is it to do with them?*

*Everyone should be treated equally, regardless of where you live, what you work as or don't work as, how much you earn etc.*

*Services should be given regardless of income..... Acceptability depends on why you are being asked (atrisk3)*

*I am confused - health service is free at point of use and should remain so. I am suspicious.(atrisk1)*

*The doctor is one of the few places that is not means tested.*

*Seems a bit odd being asked these questions, what's the purpose? Also, is it being used to really help everyone - or just a few chosen few?*

*Income not very fair. I don't want to see people being categorised when it comes to health - it isn't fair.*

The last comment also relates to possible problems of stigmatisation or labelling

Such statements may hide deeper views that may have been expressed in a fuller interview (see Chapter 7 for findings from the interviews with some NHS professionals), but further comments highlight how some patients felt a targeted approach was unacceptable. There was a clear perception by such patients that information on socio economic position may be used to target resources towards certain patients. However, there were different interpretations of what this might mean to patients.

Patients used strong emotive words when describing a concern; for example here patients express suspicion and concerns over discrimination

*I am confused - health service is free at point of use and should remain so. I am suspicious. Asking these questions implies that patient registration may be affected by the outcome of these questions. GP funding overall is not transparent enough. (NSSEC3)*

*I don't see why they are relevant, it's discriminatory. All are unacceptable. Not relevant to my state of health or health provision to me. If you could explain it to me, I would have an open mind.*

Some patients thought that being on a low income might lead to someone being excluded from registering

*If the doctor did ask he may not want you in the surgery, if he does not think your income is enough, so it is unacceptable for him to ask.*

Or it might lead conversely to being excluded if on a higher income:

*If asked I might feel they are being used to make a value judgment. Could work either way - might think I have access & resources & not want to spend resources on me. (atrisk1, 2&3)*

There was also a general view that somehow the information may be used to screen or select which patients are accepted at a surgery

*I would find it quite unusual when registering. I'd have more barriers.*

*Unacceptable if they are using the data to exclude any patients. It should be based on catchment area. If it was explained it would be acceptable. (atrisk 1&3)*

*As long as they don't compromise my registering at the practice. I may be a bit reluctant.*

*Asking these questions implies that patient registration may be affected by the outcome of these questions. GP funding overall is not transparent enough. (atrisk 1)*

*Because you would expect them to take you on regardless of income (atrisk 1)*

*It depends on whether it affects your registration or not. If there is a correlation between your socioeconomic co-efficient and your health. Some practices might be reluctant to register the patient. As long as it does not affect the quality of your healthcare. (atrisk1)*

There were also some patients who felt that this could lead to charging of patients for services

*I am wondering whether this is about banding patients to see who should pay  
(atrisk3)*

*Finance one bothers me slightly. One wonders if it is going to be used to cost  
you more to have your health checked. Are they asking with a view to working  
out how much they can charge you.*

*If I was suspicious I might think this is about finding out who can be charged  
and who would get free healthcare. I don't think this would be the case in this  
surgery but it might be the start of something*

Such statements could be linked to distrust that can be exhibited through suspicion or a negative and pessimistic perception of the motivation (Govier 1992). Such positions were present in some of the statements above, although as Hardin (2001) argues there is a complexity in trust relationships, which are not easily interpreted.

There was also a set of responses in which the idea of targeting resources through the information gained was seen to be viewed with suspicion. Whereas some of the comments relating to income and social characteristics raised earlier were in relation to procedure (mainly confidentiality), a more complex set of comments showed insight into issues of policy and equity.



These comments were made with confidence and belief and included:

*General - I might believe I am being questioned with subterfuge...a selection process. The health service should be everyone. Doctors are there to treat my illness.... If someone asked "What do you earn?" - What is it to do with them?*

*There is bound to be suspicion that your answers will affect the health care you receive, depending on the practice's attitude towards different classes of people.*

*If the doctor did ask he may not want you in the surgery, if he does not think your income is enough, so it is unacceptable for him to ask.*

*I would want to know what it has to do with registering & what bearing it has on my treatment. Does it put you in a different category or what? If explained [I am] sure I would be happy [to answer].*

## **Privacy and confidentiality**

Privacy and confidentiality are often used synonymously, but have subtle differences in meanings.

Confidentiality can be seen as a cornerstone of the medical professional / patient relationship and stems back to the Hippocratic Oath. It is the belief that any information that is passed on to the medical professional is provided in confidence

and that information will not be passed on to third parties. So confidentiality has a relationship dimension to it about the information disclosed to one person by another

There are two different aspects to privacy: privacy of the person and information privacy (Woogara 2005). Information privacy is based around consent to information being passed on – where others should not obtain knowledge of patients' information without their permission (Parrot et al 1985). Privacy of the person relates to a sense of control of an individual's space – where their identity is protected and the individual has a sense of autonomy about sharing their identity with others.

Mechanic and Meyer (2000) and Hall, Zheng, Dugan, et al. (2001) argue that confidentiality is a common concern among patients.

Certain groups of people may however be more strongly concerned with confidentiality. The BMA identified women, the elderly, and people with a history of illness as well as sensitive illnesses such as HIV as patients who particularly raised confidentiality as a prime concern (BMA 2005).

Within privacy and confidentiality is the concept of trust. Confidentiality was also connected to who is asking for the information and who would see it. Gilson (2007) stresses how practitioners who are known directly by patients are more likely to be trusted by the patients who are disclosing information. While patients may have high levels of vulnerability and hence may potentially lack trust in practitioners' motives, Katz (1984) points to how practitioners are often seen as demigods and revered by patients.

This reverential view of practitioners can create halo effects, whereby strong personal relationships shape patients views of the health system they are encountering (Gray 1997)

Socio economic position can influence perceptions of the intentions of practitioners. Burgess (2004) argues the socio economic status of a patient affects the beliefs of physicians about their expectations of behaviour, and this can in turn influence the perceptions of patients' views towards practitioners.

In the context of health care vulnerability is greater than in many other settings, as the risk of the trustee (the GP, nurse etc) not acting in the patients interests carries greater risks in terms of worse health outcomes. Holmes and Rempel (1989) distinguish between a practitioner having a positive impact on health and having positive intentions – the two are different.

Hall et al (2001) consider trust relationships as at the forefront of patients' views on whether a physician's decisions are being made on behalf of patients. There is a need for 'optimistic acceptance' by the patient, who inevitably is in a weaker or more vulnerable position relative to the physician, that the physician will act in their interest.

There were some common narratives that emerged from patients' comments that related to issues based around procedure. There were twenty nine patients whose

comments related to procedure. Of these, seven patients were classified as NSSEC3, two patients in the lowest income quintile, and five patients in the bottom two income quintiles.

A common concern was around confidentiality. This was raised in different ways, some with suspicion and mistrust about the control and use of information, but also positively, that if confidentiality was ensured acceptability would not be an issue. In this respect acceptability is based around who has control of the information and around the potential for information to be passed on to other parties without the patient's consent. The concern underlying this is the fear that the data will lead to disadvantage for the patient.

General comments about confidentiality were often made with requests for more information. Comments such as

*Acceptable to me only if it is kept personal/confidential. (atrisk3)*

*They are acceptable subject to confidentiality and knowledge of how it would be used and who would have access to it. What measures are in place to ensure this ?*

*As long as it was qualified that it is confidential. (atrisk 1)*

*As long as I know it was kept confidential & my name wasn't used. I would be quite concerned about how they would use it & if the computer could be hacked into - I am quite concerned about confidentiality.*

*Have to be sure it's confidential. (atrisk3)*

*Another concern is whether this information leaves the health centre. I would not be happy for third parties to have access to this information. It would be nice to have some written reassurance.*

The last comment has particular relevance if there are increased numbers of professionals who are involved with patient care. Who has access to the personal information – does it stay with the GP, the nurse, associated local authority?

As will be discussed later, this concern may be alleviated if there is genuine dialogue between professionals and patients and if the way in which healthcare will be affected is explained.

*I would be uncomfortable just filling in a form I would want to be sure about confidentiality - someone is dealing with it.*

Others were concerned about the place of revealing personal information where other people might hear, leading to potential embarrassment. The concern is based around both the privacy of the person where their identity is 'exposed' to others, and also privacy of information where others may hear or see information that is against their wishes

*Don't want to be overheard which can be uncomfortable, embarrassed with everyone hearing. (Filling in a form would be okay).*

*Wouldn't like to answer in front of others. Wouldn't mind filling in a form if the answers were not repeated back. Confidentiality.*

The GP was generally seen to be a trusted custodian of the information that a patient may disclose, where there were concerns expressed if others had access. A patient's relationship with GP surgery staff was discussed both positively and negatively. A pattern emerged where the relationship with the GP was seen to be positive, but in relation to other staff, notably reception staff they were not seen to be acceptable participants in the collection of data.

*....wouldn't mind if the GP asked.*

*If it is one of his [Dr X's] colleagues doing it on his behalf - like yourself - it would be alright.*

*I trust my GP so if he thinks this is a good idea it is fine by me*

*Its difficult because I have known Dr \*\*\*\*\* for a while. I know he is doing it for the benefit of the patients. I may feel paranoid if people I have not met before asked me if it was a new situation. If it is one of his colleagues doing it on his behalf - like yourself - it would be alright.*

Conversely the reception staff were seen not to be trusted with the information, with suspicion about allowing personal information to be collected by reception staff

*Face to face can ask questions. More Confidential. Not having to hand it in to receptionist. (atrisk 2&3)*

*Wouldn't be happy to be asked by receptionists because I see them day in and day out. OK if doctor asked in their room. (atrisk1)*

*I wouldn't like to be asked those questions at the reception and I wouldn't like casual office staff to have access to that info. I'm not sure that a GP's surgery would handle it properly.*

*Confidentiality - wouldn't give it to receptionists; would tell doctor but a question of how it is stored. Wouldn't want hospitals to have access to it.*

*Wouldn't give it to receptionists.*

*Other comments - wouldn't like to be asked by receptionist or at registering, but wouldn't mind if the GP asked - I have a different relationship with my GP than with receptionists.*

Associated with this was a view expressed that the reception area was not an appropriate place to complete such requests for information possibly for a

combination of the two reasons cited above, partly other people (patients) getting access to sensitive information, and second, receptionists.

*I wouldn't like to be asked those questions at the reception.*

*Not in a public environment - privacy of GP room but not at reception.*

*Unacceptable "at counter".*

*It's ok like this [in a private room] or in the doctor's room but not at reception.*

#### **7.5.4 Dialogue**

Public involvement and participation in healthcare systems is increasingly a policy aim (Martin 2008). For example this is seen in the UK with the new coalition government's White Paper, *Liberating the NHS* (2010). The aim of such involvement is linked to providing legitimacy for the policy maker. One of the common problems cited with such an aim is that too often professionals and managers retain control and manage decisions to pursue their own gains (see Harrison & Mort, 1998; Milewa et al., 1999; Tritter, Barley, Daykin, Evans, McNeill, Rimmer et al., 2003).

Hall et al (2001) describes 'optimistic acceptance' by the patient who inevitably is in a weaker or more vulnerable position relative to the physician that the physician will act in their interest. However, in this sample the following comments are symbolic of



confidence and strength of a patient's position in the health care system. It could be argued that they are offering legitimacy for a policy, but not unconditionally. They demonstrate not only a level of interest in the system, but an embedded belief that a patient's care is not going to be undermined by asking such questions. Within this dialogue there is the notion of trust between the provider and the patient. These patients, far from exhibiting optimistic acceptance, are arguing they have the right to explanations.

This could be likened to Barnes's (2007) description of a public that is empowered, consuming, responsible and a stakeholder in the health system

In previous examples above responses of patients were often expressed as statements and opinions. Some were given with a degree of certainty and conviction.

Many responses however, were made expressing the need for dialogue, asking questions and seeking justifications. There were forty six responses that posed questions.

Examples of such comments include

*Need to know motive (qualification of questions) to make them acceptable.*

*I would want to know why the practice is asking these questions (atrisk2&3)*

*It depends on how the information is used.*

*Some questions like housing and heating I can see the relevance, but others I am not so sure about. Why do they want they want the information?*

*If it is explained why it was important and I thought that it was a good reason then I would find it acceptable. Otherwise then it's a bit intrusive (atrisk 1,2,3)*

*Would want to know why income is being asked, then it would be acceptable.*

*If you could explain it to me, I would have an open mind.*

*I might wonder why I was being asked but if I was told why, I would find it acceptable. (atrisk2&3)*

*I was registering and I was asked these questions, I would like to know why it is important.*

*I would be interested to know why you need to know the income of a person - to what it relates. (atrisk3)*

*I am answering them because of a specific reason, but giving this personal information when registering would be off-putting. Some people would definitely be offended unless it was explained very carefully. (atrisk2,3)*

*If it means people getting better service then I would have no problem. I would like to know more about how the information will then be used. If I am told then I have no problem. (atrisk 1&3)*

*Am not entirely sure why this is needed. If it is explained to me then it would be ok, but I would want more information first*

The above responses generally pose questions and request more information. These are quite explicitly seeking a dialogue, but the confidence discussed above can also be seen across earlier comments which although not explicitly requesting information often expressed conviction. This can go some way to explain that while many patients raised important concerns, they nevertheless indicated that they found the overall approach acceptable. These examples of compliance are not passive; they illustrate voice and confidence with an underlying belief in a system that is embedded in their daily lives.

Examples of patients whose open ended comments suggested real concerns yet still indicated overall acceptability include

*Northern Irish - may not feel British or Irish. What are they going to do with it all? All very general questions. Are we going to get anything worthwhile out of it? Statistically useful but not being linked to quality of health care to issues such as health insurance or perceptions of own health. (not using "how is your health" - won't be able to link from this).*

*There is bound to be suspicion that your answers will affect the health care you receive, depending on the practice's attitude towards different classes of people. Could be off-putting when you are registering for the first time, may be ok if asked later because a relationship has been established.*

*.....I mind if asked about income if it is being used to judge, as it is in this case because you are categorising.*

## **6.5 Conclusion**

Acceptability will influence the way in which individuals seek health care and is important to this research with its aim of targeting one segment of the population over another. Do the target population accept the physician's reasons for doing this? Do people who are not the target population object to the approach? For this project to be used in a practical setting sufficient acceptance by all patients is needed.

There is a degree of mismatch between the overall rating of acceptability obtained by the fixed response questions and the complementary open ended question. The dual

approach of using both a qualitative and more quantitative approach has provided important complementary findings that would have been lost through a single approach. It has illustrated that more definitive positions attached to a Likert scale question can mask important nuances and interpretations of what lies behind simple closed questions.

From the fixed responses there were relatively high levels of acceptability with a slight tendency for patients identified as being in a higher socio economic position to be unsure or find the approach unacceptable. The question on income was found to be more unacceptable as an individual question, which can explain some of the uncertainty about the overall approach. However, the income question still had 84% acceptability. Nevertheless, around three quarters of respondent indicated they would find the general approach acceptable.

Open ended responses showed a divergence between views, divided between issues of process such as how information was collected and concerns over privacy and confidentiality of data. In addition, there were deeper concerns relating to issues of equity, policy and the premise of social determinants of health. While these comments were sometimes stated with an underlying compliance of fitting into the system, others sought an active dialogue, with conditional acceptance based on the need for justification and explanation.

Such apparent contradictions can be explained: it is for example possible to have both trust and distrust (Bigley and Pearce 1998; Lewicki and McAllister 1998).

The ways in which concerns have been expressed can be interpreted as the views of a population that is confident with the healthcare system that they face. Asking for more information and seeking a dialogue, rather than displaying a negative view on acceptability, is itself a form of acceptance. Similarly, many patients making bold and strong statements challenging different aspects of the approach nevertheless indicated they would find the overall approach of asking these sorts of questions when registering as being acceptable. This is more than simple compliance, but expresses a level of trust in the healthcare system.

For the research to be able to be used in a practical setting, there would need to be more systematic engagement with patients in the approach used, creating space for dialogue to allay fears expressed in this chapter. This would require fuller explanation and opportunity to ask questions and receive replies. Patients are likely however to comply in any case, since they may have little choice; however compliance alone is insufficient for such an approach to be acceptable and fully effective.

## Chapter 7 Perspectives of professional staff

### 7.1 Introduction

Earlier chapters established two components for a framework to analyse the identification of socio economic position as a basis for a vertical equity oriented healthcare. First, Chapters 4 and 5 put forward a method to identify an individual patient's socio economic position, and Chapter 6, analysed a survey of patients understanding and perspectives on such an approach. This chapter explores a third component, the views of a small number of selected professionals in the NHS. Chapter 8 draws together these three different, but related elements of the research to draw overall conclusions.

The literature review in Chapter 2 and the discussion in Chapter 6 highlighted that there are multiple meanings and interpretations of the concept of equity. The analysis in this chapter will draw on the theoretical work outlined in the literature review, as well as making reference to some of the conclusions drawn from the patients' perspectives in Chapter 6

The key aims of the chapter are to explore three areas within the perspectives of the professional staff interviewed:

- 1) the meanings attached to equity in healthcare
- 2) the issues that affect their ability to improve equity in healthcare

- 3) their views on the approach taken in this project to identifying the socio economic position of individual patients

It will start with a brief overview of the method adopted in the chapter before presenting the findings through a thematic analysis of the interviews.

## 7.2 Overview of method

A fuller discussion of the method adopted in this chapter is provided in Chapter 3, but a brief recap of the method is outlined here (see Appendix 1 for the interview probes).

Eight interviews took place across Lambeth with professionals working in different roles. The interviews took place at the interviewees' workplace and lasted for around 20 minutes. Participants were informed of the nature of the research and that they would not be personally identified, as well as the fact that the interview would be recorded for later analysis.

The interviews are not intended to represent the views of all healthcare professionals in Lambeth, but to explore the views of a particular relevant group of professionals. The professionals were either based in one of the GP practices whose registered patients were part of the study, or if not based in a clinical setting were directly involved in primary healthcare in Lambeth. The selection was undertaken through a snowballing approach within the constraints of their availability and their location in



Lambeth. Professionals in a variety of roles were purposively sought to give insights into perspectives from different areas of primary care.

The roles of the eight professionals and the labelling in the findings are shown below

- Three GPs (GP)
- A practice nurse (PN)
- An equality professional (EP)
- A public health consultant (PHC)
- A senior refugee health worker (RHW)
- A public health manager (PHM)

The analysis draws on the position individuals have in the NHS, but does not include reference to the interviewees' personal demographic and socio economic characteristics, although it is recognised that such characteristics can shape perspectives and answers given.

Different professional roles create different proximities to patients, and this will shape individuals' perspectives. Healthcare policy makers, administrators, and practitioners can potentially take numerous factors into consideration as to what contributes to equity in health care. What differentiates their positions may be about what constitutes equity in health, but also be derived from their own spheres of experience within their roles. Where possible, any patterns of comments by the nature of the role will be identified.

NHS staff often mentioned the state of constant change that takes place within the system, and at the time of the interviews in 2010 there were high levels of uncertainty, with a new coalition government in place.

Several themes are explored here that emerge from qualitative analysis of the interviews, and that pick up on different aspects of the literature surveyed in Chapter 2.

- a) Diversity of the population in Lambeth
- b) Social and economic determinants of health
- c) Individual capabilities – the ability of patients to achieve good health
- d) Different understandings of equity in healthcare
- e) Obstacles to improving equity in healthcare
- f) Provision of healthcare adapted to individuals' socio economic positions

Within these broad themes, sub themes or different elements will be discussed

## 7.3 Findings

### **a) The diversity of Lambeth's population**

There was widespread recognition of the diversity of the population of Lambeth. This was not presented in a negative way, but was often expressed as adding complexity to

healthcare decision making. The diversity presents a particular challenge for this research, given that a key focus of the research is to measure the socio economic position of individual patients. The key measurement objective is to place patients in a hierarchy of socio economic position, but the more socially and culturally diverse a population, the more challenging is the attempt to use simple acceptable proxies to accurately measure the two benchmark measures of socio economic position.

Diversity was expressed in different ways relating to a range of socio economic characteristics, with the GPs particularly highlighting issues of ethnicity, language and family structure as being a key part of this diversity. Two GPs particularly emphasised this complexity:

*“I think you know some of the characteristics of our practice are that we are in a very diverse area in terms of ethnicity, language, economic position - we have higher average numbers of people that have very significant problems with mental health , D &A abuse, much more HIV, .... So I think we are unusually atypical “ (GP2)*

*“In this population, it’s complicated by the high proportion of people who have been born abroad and that have ended in difficult complications. I mean one is if they come from a developing country the people carry the risks of their social origins with them even if their social circumstances have improved. But also just migrating from one place to another is in itself very stressful. So there are sorts of factors added in to the usual mix of people being umm in the lower social status” (GP1)*

*“And aspects like that, I think people quite frequently living here may be less connected to families and structure is much more people are on their own not with extended families” (GP2)*

The following statement also highlights the more transient and dynamic nature of the way people may move between socio economic position throughout the life course. The suggestion by this interviewee is that health problems arise at different times, and may be linked to moving in and out of poverty.

*“I think at first because Lambeth is a very heterogeneous population so we might have very different factors which affect health and we now turn to speak about the life course so I think we have a different problem at different part of our life” (PHM)*

One of the reasons put forward in the introduction to this research for measuring socio economic position was the diversity of the population within very small geographical areas which may, make post code analysis an unreliable measure of a patient's socio economic position. The mixed demographic one finds in Lambeth within small geographical areas was commented on by the equality professional.

*“There's definitely issues when, you know, just one street of Lambeth you have a millionaire.....uh....students as well, you know, asylum seekers who are, you know, there's 20 people living in a 3 bed relatively big house, you know” (EP)*

## **b) Social and economic determinants of health**

Any meaningful discussion of equity has to include reference to the link between health outcomes and social and economic factors. There was more or less universal agreement across all interviewees that health outcomes are linked to social and economic conditions. There was agreement that there is a stratification of risk, and that this risk is made more complicated by socio economic conditions. This recognition forms an important basis for a vertical equity based health care system, but only one part. The second element is formed by the actions that are needed to address these risks. When asked about key factors that affect the health of patients in Lambeth, all the interviewees referred to socio economic conditions, albeit using different terms to describe these factors.

Some used socio economic status as the description

*“we know very clearly there are groups of people who do less well in terms of outcomes. There are a range of conditions that can be predicted by major factors including social status, economic status, probably thinking about here” (GP2)*

*I think we might have up to now not considered enough the social economic background of a patient. I mean even if care is free at the point of the entry the other constraints which I have to say to your social economic status which might impair your access to care (PHM)*

Others used other terms including social circumstances, disadvantage, income, wealth, class, economic grime and poverty. The common aspect of all these comments is an acceptance that health is intertwined with social and economic factors.

The comments below from the three GPs all refer to economic factors as underpinning these conditions such

*“poverty, yeah, plays a big part “ (GP3)*

*which I think has an impact we clearly have more stresses, threats of worklessness and economic grime.. I think we got, we got most things here. (GP2)*

*Umm say in parts of the UK where the differences are essentially the difference in wealth and class, those have a huge effect on whether people get their wants and needs addressed (GP1)*

The Public Health Manager described the more general social and economic background and public health consultant cited income

*Okay, I am not working regularly with patients, I think that is important to know, from the work that I am doing looking at a great deal of factors I would tend to say now that the background from which people come from is very important. I think we might have up to now not considered enough the social economic background of patients (PHM)*

*“income and the, all the things that that represents, if you like, that come with the gradient of income .” (PHC)*

GPI commented on the combination of genetic and socioeconomic conditions as potentially mutually reinforcing. Such a comment is consistent with the view that genetics alone cannot explain health differences, and challenges Whitehead’s view that biological factors are not a concern for equity ( see Chapter 2, Section 2.3)

*“Well it’s certainly a combination of genetic factors and umm the social circumstances... and I think it is difficult to completely unravel .. put priority to one or other of those two things because I think it does play differently to some extent in the different individuals ..... but umm.. the influence of umm... people’s social factors is enormous” (GPI)*

The equality professional linked policy with social and economic disadvantage, the only interviewee to directly state this link, although the discussion on obstacles to health in this chapter shows that other professionals saw policy as important in determining health outcomes.

*Um, I think it is probably a mix of a social economic disadvantage coupled alongside, you know, the kind of characteristics outlined in the equality legislation (EP)*

There were other factors included in the responses, such as GP3 identifying genetics and the EP raising the relevance of the equality legislation.

The conclusion drawn from analysing the responses to the question as to what affects the health of patients was that all interviewees held a clear and unequivocal belief that social and economic factors matter, with recognition that other factors (e.g. genetic) have an important role and make this a complex mix.

Within the discussion of social and economic determinants of health there were three particular medical problems that tended to be raised in this discussion: mental health, diabetes and problems of smoking. These were offered as examples of problems for which the health professional could see a direct link between socio economic background and health. Such comments were not exclusively made by active practitioners, but the GPs and the nurse were more likely than the others to discuss socio economic determinants with reference to particular medical problems. This finding is developed in the next section in relation to individual patients' ability to manage health problems associated with these three areas.

*We have higher average numbers of people that have very significant problems with mental health (GP2)*

*lots of diseases, um, chronic disease like diabetes, um, actually some mental issues as well that may have less of a family history but tends to be around their background. (GP3)*



*you know that there are preventable conditions, conditions which too many people regrettably, have such as type2 diabetes to and the risk will ensue in the social status on a scale, so there are people coming with immediate health needs which could have been prevented (GP1)*

*Among the working age worklessness has definitely been a big trigger here for mental health issues (PHM)*

The broad acceptance that health is linked to social and economic determinants is perhaps unsurprising given its widespread acceptance across the health literature. However, it was particularly noticeable that the Lambeth interviewees placed such an emphasis on the strength of this as determining factor. There was acknowledgement of genetic and family history as a causal factor of health outcomes but there was little doubt that social and the economic conditions increased the risk of exposure. This view is an essential, but not sufficient condition for an agreement on a vertical equity approach.

There was also an acceptance that patients from lower socio economic groups require additional or disproportionately more healthcare (in the widest sense) to prevent and manage health problems compared to patients from higher socio economic positions.

The next section explores the views relating to the extent to which patients have control over their health outcomes.

**c) Individual capabilities – patients' abilities to achieve good health**

Chapter 2 outlined criticisms of the choice-based approach to equity in health. It argued that Whitehead's basis for deciding what is and is not a concern of equity could be challenged by Sen's work on functionings and capabilities. The basis of the capabilities argument is that individuals have different sets of capabilities that influence their ability to be healthy. The Chapter 2 discussion was used to challenge the extent to which individual behaviour of patients is somehow not a concern for equity if patients are exerting free choice to behave in a way that damages their health. It was argued that such behaviour is often a result of a lack of capability sets to successfully achieve the functionings of good health states.

There were many comments in the interviews that supported this view that patients had restricted capability sets. This created barriers to the functioning of good health and that directly relate to behaviour that damages their health. Within the discussion around the limited capabilities of patients, different sub themes emerged

Some were based around educational background of patients and the ability to use the education they have:

*"I think peoples' education, understanding, maybe good pension, language are major factors there about what to do, how to do things, knowing where to go for the right thing at the right time may not be the case. We assume people see read hear info about things that may not be the case" (GP2)*

*levels of education and I think maybe that has a very high bearing on it in terms of your success at education your expectations of education and what it means you are able to do as a result of education... um... and the relationships and the family relationships that you end up having that can be stable or unstable, I guess...uh...and what that does for your ability to kind of be an effective adult (PHC)*

*you know their education, because if they are better informed about something they probably make more demands because they are more knowledgeable and quite rightly so, and then they make more demands and umm then their provision of care may be different to somebody who is less knowledgeable and less demanding (PN)*

There were a set of comments that more generally identified the lifestyle of patients as a constraint to healthy outcomes.

*So I mean for example, umm many of our poorer patients who have the 2 or 3 jobs and may be working up to 15 hours a day or something like that. So you know, proposing a lifestyle change which involves going to the gym is a total waste of time. So obviously the ultimate solution to that is a more equal umm payment for work and better working conditions and better work life balance (GP1)*

*I think probably family history, ethnicity but then their own lifestyle as well, um, so I... access to healthcare is important but often secondary (GP3)*

The point made above by GP3 that healthcare is often secondary, points to the challenge facing healthcare interventions when patients' lifestyles are themselves a fundamental barrier to good health.

*We have now long term conditions really predominate all the lifestyle becomes very, very important (PHM)*

*.... Further upbringing may have just got, um, patterns in their life which don't fit in with a healthy life, you know, they eat badly and exercise little and it just goes down through generations now unfortunately. (GP3)*

A further constraining aspect of lifestyle is the degree of flexibility in lives and how the healthcare system does not match the lifestyles of some people. Two GPs mentioned that access needs to be easier and more flexible.

*so people need to have different means of access, so telephone face to face different venues, different times, (GP3)*

*can be through different forms, it may be dropping into a, um, a clinic on the high street or it could be being able to book a phone call it doesn't have to be face to face access with, to their own GP or to their A&E department. (GP2)*

There was the recognition that certain groups struggle in their daily lives to be effective in managing their medical conditions. They may be more likely to suffer

from a particular condition, but the effects are compounded by limited ability to self manage.

*Sometimes the need is, um, how well certain groups, um, are able to manage their conditions as well (EP)*

*.... To live with my condition and its very much how do I live how do I eat, yeah, am I able to remember to take my pills, do I have time to exercise that how do I organise my life around the health issues I think is very important. (PHM))*

A specific comment by the nurse was made about Afro Caribbean patients' ability to manage diabetes, highlighting cultural difference as a factor in managing health:

*So, I mean for example we have quite a high West Indian, Afro Caribbean population, and my role is involved in diabetes education. As I'm a diabetes nurse, so umm, I would, I see a lot of people who consider diabetes to be something they are ashamed almost, and umm they certainly don't even tell their partners sometimes that they've been diagnosed with diabetes, umm, and so you know, they don't want to come to terms with it themselves umm, and you know they have a far worse view of it and they are less able to manage it because of these preconceived ideas, and that's a major stumbling block. (PN)*

The public health manager discussed ways in which patients from low socio economic backgrounds found it more difficult to convey their needs and adapt their behaviour and used smoking as an example.

*The sort of ability (patients') to express to a health professional what you think and how what you think happened to you - managing something so you might say yes, yes, yes to an advice and then find it difficult to concentrate on it . I mean when we did, say, evaluation of the health trainers and I spoke with clients, most of them say changing is costly, so I think we haven't focused enough on that in the NHS (PHM)*

The diversity of the population discussed earlier implied that there are major issues of language and culture, and these are elements come out in several comments:

*"think there are other things that may be about language culture umm something about engagement" (GP2)*

*"and they have language difficulties," (GP3)*

There were also a series of comments that can cut across issues such as culture and education discussed earlier. These were based around confidence and knowledge of how to engage with the healthcare system. GP3 raised issues around knowing when to access healthcare

*it depends on their knowledge of health care systems, how it works and whether they feel able to access it themselves, certainly the very vulnerable wouldn't know how to access it and they have language difficulties, they may have mental health problems which means they don't know that they need to see a healthcare professional (GP3)*

When probed about what one GP meant by access, GP3 stated:

*I would see it as having patients who understand how and when they should come and see me as a GP and be able to do it when appropriate, but that's my view. (GP3)*

The practice nurse saw cultural differences as a barrier to changing behaviour, when asked about whether more interventions and greater resource should be allocated to poorer patients, she agreed, but argued it was about more than money:

*Umm I think that's extremely difficult, because mainly it's a cultural difference, umm so if you've been brought up with something from the cradle to actually change someone's fundamental beliefs, its extremely difficult, so actually it sounds really negative, but I think no, there probably isn't a lot that one can do.... Umm I think sort of peoples expectations are different. Umm I think people from wealthier background will have a certain expectation and are probably more demanding, than people that are less well off (PN)*

GP1 saw the consultation itself as being potentially problematic

*Well its I mean more than getting through the door, um you know to the consultation room, but umm, getting through the door to consultation room with someone with their permission, who is able to perceive what their needs are and those are not easily articulated or necessarily perceived by the person themselves (GP1)*

*The fact people lower down the social scale, they consult the general practitioners say tend to have chosen conditions which are reactive to umm an immediate symptom or stress. Where as people higher up the social scale, have fewer yet longer consultations um which is a better level of communication with practitioners so if the doctors are likely to be from the same class (GP1)*

This view was shared by the equality professional

*depending on the need of that individual, so if you have slight learning difficulties disability, or difficulty with a first language, um, then how are you able to, um, engage to interact with care professionals and to offer, you know, best care for you, um and also manage your end of life care too? So, it's vast! (ADE)*

The practice nurse however saw her consultations as often being able to explore important social and economic aspects of her patients' lives that the GP may not be able to do. This was partly explained by having more time, but also patients being less



intimidated by a nurse as compared to the doctor. This view echoed some of the findings from patients discussed in Chapter 6.

*So we are at an advantage there and we perhaps would know things that the doctors may not know, and that perhaps patients feel that they could confide in us and they don't want to be wasting the doctors time, kind of thing, whereas they don't see it as wasting a nurse's time, so it's the different perception of the roles of nurse and doctor (PN)*

**d) Different understandings of equity in healthcare**

Central to the literature review were the different interpretations of the meaning of equity. Embedded in this discussion were the different interpretations of access and need which feed directly into the difference between horizontal and vertical equity. When professional interviewees were asked about equity there was at first a general recognition that it was around equating access and need. This was at first often expressed in a way that could be interpreted as a horizontal approach to equity.

*What is a fair or equitable health care system? ...uh...well I think it is a system that doesn't...um...rely on your ability to pay... uh...in money, certainly, and is going to respond to what you...your health needs (PHC)*

*one that is accessible to all (RHW)*

*Well, equity is more, as I understand it, is, um, equal access to need, um, which I'd hope there is anyway (GP3)*

*that basically the basic access to primary and secondary care uh can be made available to everyone who is in this land and specifically the refugee and asylum seekers will have come from a series of tragedies, tragedy about a human conditions, (RHW)*

*I think a fair health system is a system which is able to answer that people with, that have a have a health problem are able all to access the system, (PHM)*

However, when probed how this links directly to the population of Lambeth, all of respondents argued to different degrees that a more vertical equity approach may be required to address unequal health outcomes.

These comments were articulated in different ways. A common message was that need and resources should take into account the socio economic position of patients.

The public health consultant described the need to acknowledge socioeconomic factors in healthcare:

*if you see going to effectively, if you're going to make changes in a person's life which is going to benefit their health and then their social and economic position needs to be taken into consideration, (PHC)*

GP3 compared patients from low socioeconomic backgrounds to patients from higher socioeconomic backgrounds:

*you need to enable the same equality of access for those two groups and some people will demand more resources because of their low socio economic background, so that's the way it naturally goes..... I think there's some people who, whose, um, non medical problems mean that they do demand more resources (GP3)*

*I suppose I feel it should be equitable system so those would need, should get the, should get a priority funding so, either way, yes, I think money should shift down(GP3)*

GP2 used the word targeting to illustrate how resources should be allocated towards patients in lower socioeconomic positions

*I would think that we should target inequality and make priority the lessening of inequality so that services may therefore need to be targeted rather than the universal in some respects (GP2)*

When probed whether it was acceptable to use more resources for lower socioeconomic groups even if this meant taking away from higher socio economic groups GP3 agreed that this was acceptable

*I think high density populations, poor populations going to need more healthcare resources than a rich, well fed population...there's a gym down the road.(GP3*

Chronic illness was used to articulate the complexity and broader need that lower socio economic groups have.

*I mean, umm, if you... if for certain individuals who have, you know, multiple disadvantages .....there is some individuals and groups who um have multiple, number of needs and so, you know, access to services are much more difficult for them...um...and would require...um ...they can be quite resource intensive individuals so people with severe mental illness for example (EP)*

When probed what this would mean for allocating resource the EP stated

*sometimes, you know, based on needs, additional resources need to be invested in and all this needs to be done very clearly and has to be very clear rationale and needs to be communicated effectively as well. (EP)*

These arguments were further supplemented with particular examples of smoking, diabetes and mental illness. There was widespread recognition that, first, socioeconomic position was a risk factor, but for healthcare to make a difference, patients from lower socioeconomic positions needed greater resource. This related to preventative work targeting vulnerable groups as well as treatment and follow up. They illustrate that patients' in lower socioeconomic positions are likely to have more limited capability sets.

The example of smoking was used by three of the professionals

*I think later once you have access to service is that you are able to benefit in the same way and that will mean that we offer a different package for example we hardly looked at that with smoking, um, and we have realised that if we want where is the building of smoking is among certain population group now very much, yeah, manual routine workers deprived population (PHM)*

The will to stop smoking for example may be there, but an individual's lifestyle, their social and economic circumstances can make this much more difficult

*If you want them to be able to access the support you have to do a very different approach because first they need to be interested in it and not in the same way. Secondly quitting smoking has a different impact of someone is employed or someone lives in very deprived area than someone living in better off area, yeah, because if you quit smoking you are smoking because somewhere need that, yeah, I mean single mum once said to me one day to me,*

*the kids are gone I can sit and have my cigarette and just relaxing ....what I need to do to help someone stop smoking varies and is bigger in some groups and there I would need to allocate more proportionally resource. (PHM)*

The ability of individuals to freely choose less damaging health behaviour independently of their social and economic background has already been challenged in Chapter 2. When probed whether patients from different socio economic backgrounds should be treated equally with regard to smoking GP1 stated:

*It is based on the assumption that intentionally individuals can make wrong choices, but those are determined by social determinism, and secondly that you can address it by the process of advice and support to individuals. It's not to say that you shouldn't trying & help someone to stop smoking and it's no use giving people certain types of support but it's that there is less chance of them being able to stop (GP1)*

The practice nurse also used smoking to illustrate how the capability set of a poorer patient is more likely to be limited and consequently that person is less likely to give up smoking:

*everyone knows they should stop smoking you know and someone landing on earth from Mars would then come here and realise smoking is bad for you, umm but its far too simplistic to say we have to educate everyone to stop smoking and then they'll stop smoking, because that's not going to happen, so it isn't as simple as just saying putting money at something. Because if you are*

*on a very low income and you may be unemployed, and you don't have any stimulus from your work you may have a very poor upbringing you know and no family network, then actually there's very few pleasures in life and having a cigarette is probably something that's going to get you through the day.*

*(PN)*

The nurse who made the last comment reiterated her point about it not just being about committing resource:

*you've got to change things quite dramatically so its not just a question of throwing some money at something because that, that's just the tip of the iceberg really (PN)*

She also saw individual health beliefs as an important factor that shape their behaviour and these are deeply engrained

*Well I think their background will be an very important thing, umm all health beliefs will actually influence that hugely.*

The public health consultant expressed a view it is not simply a case that such beliefs need to change, though this was important, but the system needs to accommodate them better:

*..... to be able to accommodate your health belief systems I suppose...uh... not necessarily to collude with them...uh... if they're mistaken or leading to more harm in your health, but to be able to effectively work with you on your beliefs and knowledge about health so it is actually ideally a health system should be informing people about what sort of health and how to promote and preserve it. (PHC)*

One of the arguments outlined in Chapter 2 in discussing vertical equity was that the needs of patients in lower socio economic patients go beyond a narrow access definition of waiting for a patient to be treated. Their healthcare needs are broader and should be addressed using a more holistic approach, looking at prevention, education and follow ups – all of which are likely to require greater resource the lower a patient's socio economic position. This argument was expressed in different ways by interviewees. Some argued that more preventative work was needed and that low socio economic groups would need to be targeted

*GPs would see and we do follow up vulnerable patients rather than waiting for them to contact us, but it's reaching those ones I think is important as they can't fend for themselves always (GP3)*

*the ability to try to be preventative more than just waiting for the last minute. I think we were speaking about that in fact this morning in diabetes. It's the most deprived the less likely health is a priority so you will wait really until the last moment to go to see a health professional for a problem and it is*



*already acute .....so it is trying to understand how people make decisions about their health and if it don't start from there I don't think we are able to adapt our services to people.(PHM)*

*I suppose the other thing about it is that a really equitable health system should be interacting with other influences on health so it's not just about treating the individual when they become sick but working on how to promote and protect health. (PHC)*

There was a perception that in order to address health inequalities a broader approach was therefore needed, to include other services

*you know look at a person holistically. (EP)*

*second, also the big element is the wider determinant, right, and there we need to work in partnership with all the local authorities, voluntary sectors etc because it is everybody's business. (PHM)*

*I mean they might not be able to solve it but they need to be working very closely with other organisations and agencies in order to be able to, sort of, have a holistic approach...uh...and that works just as much in the primary setting as it does in the acute setting.(PHC)*

**e)      Obstacles to improving equity in healthcare**

Interviewees were asked about the obstacles that they could see to improving equity in healthcare. There was a wide range of responses to this, and while there were some similarities in responses, there were also some differences. A good example of differences was the concern particularly expressed by the GPs that time and resource was a key obstacle in delivering more equitable healthcare. While they also acknowledged broader structural changes, they were more likely than the other interviewees to make the point that micro interventions make a difference, but that they do not have the time to follow this through.

GP3 raised the lack of time and increasing complexity of consultations as limiting what they can offer. While, as said earlier, more contact and more intervention were seen as desirable, there were practical constraints

*If we had more time with individual patient and more time to have more consultations that would improve access ..... I suppose the barrier there is partly resources and having time to contact them, um, it's also actually being able to get out to access them sometimes some with mental health problems (GP3)*

*our roles are expanding all the time so every patient we see will have 5 or 6 different aspects of care we have to, um, bring into the consultation .....as more and more we can offer now and because of that we are squeezing out other patients, so I think its tight time and resources, um, finances are being squeezed across the board and services are being moved into general practice without the resources to actually meet the financial costs of it (GP3)*

*We don't have the resources to go and check on them every week at home so a CMHT or a CPN may be able to, just to check if they are okay. (GP3)*

The above comments also showed a willingness to engage with patients, to have more contact with them, and the importance of this contact. The squeezing out of other patients was a particular consequence of having to deal with patients who are in the consultation room, and not being able to find space for others who may not visit the practice, but need that contact – the kinds of patients discussed earlier who are likely to be in lower socioeconomic positions.

This view was supported by the practice nurse, who had more time and found this valuable for finding out more about the patient. She also commented on how her relationship with patients encouraged openness (see Chapter 6 on patients' perspectives for comments on the GP/patient relationship) and how patients would not want to bother the GP with what they saw as non-medical issues:

*... certainly with my diabetic patients, because I see them here regularly and I've been here a long time so I've got to know them over the years so actually probably I do know them quite well, so and nurses' appointments are usually longer than doctors appointments. (PN)*

The long term continuity of care is a central part of general practice and has been described as its defining feature (Burke et al 1993, Starfield 1994).

The refugee health worker made the point that some patients need more time to build trust in order to divulge sensitive information:

*historically GPs in the past were able to be your family doctor that possibly knows you, who possibly cares. At the moment they are put under a lot of pressure, so all the trust that entails speaking to someone until they reveal the real situation, most of all those who have been traumatised, tortured and perhaps even tortured by a medical professional; umm ( pause) it is about building relationships and trust.*

This point illustrates the importance of repeated interventions and contacts with patients in order to gain an understanding of their needs that are often shaped by social and economic factors. When probed about how this was important for patients with whom the refugee worker was involved, the comment was:

*One of the things that our services may be criticised for is, we have a GP specialist services.... But one of things people don't understand is precisely because the trust evolves at the third meeting perhaps the client will reveal they have been gang raped and they have been tortured and they have lost their relatives do not have the guts to find them right now because they need to find food and shelter while they walk between among cafes of London seeing people wasting food and money. So it's tragic and what happens is via that very old fashioned thing which is human relationships, we can deal with it.*  
*(RHW)*

There were also a set of comments that highlighted obstacles that were more closely linked to the way in which primary care is organised. These were more systemic and included the issue of targeting.

When asked about obstacles to focusing more resource on patients from lower socioeconomic backgrounds, the public health consultant explained how there was a 'top down' approach that created obstacles

*.....I guess...uh yeah...and I think the top down stuff...uh...also means it's really difficult to think about how to provide an equitable system because it is very much target driven, been about average performance..... and only very little about narrowing the gap, it has been a bit about narrowing the gap, but most of all...most of the targets have been at average performances*

Discussions of targets arose in several interviews and were seen as an obstacle for achieving more equitable healthcare. The reference to targets below by GP3 was questioning the role targets play in restricting what he could do outside the consultation room

*We have to recall patients all the time to meet targets and to manage chronic disease, and chronic disease management is getting more and more complex (GP3)*

The public health consultant was clear in her view that targets create problems due to the nature of how they are measured. She argued targets inevitably lead to a focus on

average performances and not about looking at the whole distribution. In particular there is a lack of focus on the patients in lower socioeconomic positions who would require more resource to meet the targets being set.

*I think traditionally people in health service, both commissioning side and providing side, find it really difficult to figure out how they should focus on the least healthy groups when there is financial restrictions and they retreat to looking at average health ...um...and how to cause least average harm and without realising that...um... when you start to restrict stuff, most damage will be done down the line on the...those least able to sort of make best use of health services...um...and they're already at higher risk, you know.(PHC)*

This point was supported by the equality professional who tied in targets to contributing to a culture of being risk averse with the main priority on hitting such targets

*The culture of parts of NHS which, in my experience, I've only been in it of 2 years, doesn't always reward risk taking, it rewards being risk averse and I think that's been an issue with centrally driven targets (EP)*

Issues concerning how different staff work, relations between different NHS roles and the ability of staff to take on issues of equity were also cited. There were general comments about the need for staff at all levels to contribute to improving equity. It was not seen as any one individual's job, but there were different interpretations of how staff interact with this agenda. The more general comments about the need for

staff to be trained across all levels came from the interviewees who worked less directly with patients

*So in terms of structurally, what you need to have is...is staff who are very clued up to an individual's multiple needs and multiple identities when they are delivering services and be very mindful of that (EP)*

*I think they are a crucial role in terms addressing equity and equity of outcome and it's a role change in our practice to have the role so the additional factors being able to deal with patients from different social backgrounds people we understand have experience of very very different health system is very important. So the role of the receptionist is essential and the role of the practitioner being aware of the social economic condition which the patients live could be different especially for long term conditions I feel that's very, very important. (PHM)*

*I think most people still think that equity is a discretionary sort of a thing that you and that you...and it's a nice thing to do rather than being essential to good....I don't think we prepare or train or develop managers in the NHS to do that sort of thing well. So I think there's a systematic problem in the sort of skills and competences that we....we should be equipping people with. (PHC)*

There was a view articulated by the PHC and GPs that proximity to the patient inevitably leads to an understanding of the complexity of a patient's socio economic position affecting their health, and that in the past GPs had time to really get to know their patient and that this was important:

*when I was doing my clinical work as a student, a student doctor, you know learning to...uh take a history and having it drilled into me that I should always ask a person their occupation and not be restricted to their occupation at the time so especially if someone said they were retired ...retired what...coal miner or bank account...bank manager, you know, and even to specific to specific questioning around to possible exposure to stuff or...that's really...really important in understanding a person's situation (PHC)*

*And umm.. in the course of providing clinical care, I ask questions related to that, or at least its in part trying to figure the ways of how you, umm, communicate with someone about their current economic position and what are their likely options in terms of taking up these sorts of action, um, I would imagine most people do this, however they are often asked what their job (GP1)*

The point about proximity and repeated contact with the patient leading to a greater understanding of patients' needs was commented on by the practice nurse. She was probed on whether her particular role helped understand patients better:

*Yeah probably, probably certainly with my diabetic patients, because I see them here regularly and I've been here a long time so I've got to know them over the years so actually probably I do know them quite well, so and nurses appointments are usually longer than doctors appointments, so we are at an advantage there and we perhaps would know things that the doctors may not know, and that perhaps patients feel that they could confide in us and they*



*don't want to be wasting the doctor's time, kind of thing, whereas they don't see it as wasting a nurse's time, so it's the different perception of the roles of nurse and doctor. PN*

However, there were also comments made about the role of receptionists who while being a first point of contact do not directly work with patients in the clinical sense. Chapter 6 also identified suspicion and mistrust of receptionists among patients.

The strongest comment made by any of the interviewees was the refugee worker who stated

*At the moment we have a problem ..... Which is receptionists of GP surgeries are like immigration officers, they will discriminate anyone beyond the call of duty, because its only human if you give them that task. (RHW)*

The existence of discrimination was also commented on by the equality professional.

*I think some people are so much more focused on the thing that the wider determinants of poor health...are the most important factors and... but I...and that's the causal factor of poor health, I mean, that's just saying Marmot's and HI literature and so forth... um... but there is still discrimination as well (EP)*

Concerns that the structure of the NHS was a problem was also put forward particularly by the equality professional. Part of this was seen as a historical problem:

*I think it's one of the issues I've seen in the health services is people get very locked into their silos and their professionalisms and so that happens when the equality professions and will...sometimes very uneasy about...um...embracing new language because they feel it dilutes...um...their professionalism and um , you know, the particular history that has created either their posts or um, you know the systems or the national frameworks.*  
(EP)

*sometimes you are asking people to adopt a different way of working as well, ....., but sometimes people can get very, um, happens with me, um, you get really pulled into ...this is, this is, this is...I've been doing this for x number of years , this is how I want to do things, how open are we into embracing new ideas and innovation, um, and approaches. A lot of people are, but there's, pockets which are very resistant to that as well. (EP)*

The public health consultant and the equality professional particularly referred to the complexity of the organisation of the NHS and its links to other key organisations in local authorities which make a joined up approach to equitable healthcare difficult.

*Yes, unfortunately current policies prevent access at different layers and levels, although access is in place, in certain levels sometimes it is prevented*

*by what we spoke earlier about a bus pass that is now available in that context.....*

*I think what it is sometimes, because we do not monitor the outcomes uh we do not have a good system to monitor how it affects most of our less visible groups, then we end up that actually have a system that creates holes in the net rather than preventing people from going through the net. (RHW)*

*things are done in a very fragmented fashion.....as a focus on a service or maybe on a conditioned area, that's absolutely critical, that's very, very important...but sometimes it needs to be bit more than a holistic.. , very important..., and so it it's proper fair and equitable treatment so... care pathway for example, um, needs to be...needs to follow the patient's journey across the whole of the health service. There are a number of vested interest groups many interests. (EP)*

The EP also explained that there were also problems with communications between different parts of the system. When asked to give examples the EP stated:

*There is a difficulty in dialogue.. Public health, maybe the Local Authority's division of health, for instance, may have, theirs, been issues, there's kinda, there needs to be a shared language and shared understanding (EP)*

*there's also, you know, issue leadership as well, you know, um, if, I'm not necessarily talking about NHS Lambeth, not just Lambeth but, um, if you got leadership in the organisation who speak about health inequalities every single day of their work, every single thing that gets rolled out communicated*

*is geared towards trying to reduce health inequalities.....you have to convince leadership that it is worth to do it and in the commissioning organisation as we are know it is very much thinking about money and how much do you do you save to invest in inequalities. We are just at the start really of trying to demonstrate this (EP)*

However, there were also comments that raised issues over whether a vertical equity approach was feasible in the existing political and economic climate. When asked directly whether resources should be targeted in such a way both the public health consultant and GP2 cited political barriers.

*I think it would be morally justifiable..... I don't know that it would be politically acceptable and I think it would be very difficult to actually implement...uh...I don't quite know how you could achieve it...uh...yeah. I mean in a sense, in a society where there's income tax is graded according to income, then you are already doing that in a sense that the rich pay more. Um...mmm...but I think you need to do... when you actually talk about implementation you need to do more...uh...to get to identify a target for people who need health services the most, so you need additional activity. (PHC)*

*I think needs to be taken politically, I think as local health commissioner and provider I think we have, as commissioner for Lambeth I think that is the correct thing to do in a range of areas (GP2)*

- f) Provision of healthcare adapted to individuals' socio economic positions

### **The importance of the individual**

As discussed in earlier chapters, measuring the socio economic position of individual patients is a key part of this research. The argument outlined in Chapter 2 is that if this can be done accurately and in a way that is acceptable to patients, it can form the basis for a vertical equity approach to health care. The comments made by the interviewees in this chapter raise different points that relate to a healthcare system that is based on the needs of the individual patient. There was a general consensus view that healthcare should be based around the individual with comments such as

*I think...the, the essence of either an equity or an inequality is...it's all very similar sort of stuff which is what people to access various services from want - people to be treated properly and fairly depending on their...based on their needs and individual characteristics. (EP)*

*if you're going to make changes in a person's life which is going to benefit their health and then their social and economic positions need be taken into consideration. (PHC)*

The challenge of the diversity of the patient population and their multiple needs was discussed by referring to the analogy of the ways in which the private sector finds out

about their customers needs. One interviewee drew extended analogies with this approach. It could be argued that this interviewee is identifying the need for better information on patients needs.

*I think you can pick up the private sector and you look at something like Sainsbury's or Tesco's both... model of you know delivery...um...but your Carphone Warehouse sometimes you hear horror stories where treatment, you know, where the quality has been awful, but actually the way those organisations go in competitive advantage is to...a...deliver services tailored to meet individual needs of somebody. (EP)*

### **Measuring socio economic position**

There was more divergence in opinion when it came to the project's approach of aiming to identify the socio economic position of patients when they register (as outlined in Chapter 5). Some views expressed supported the approach. There was recognition that a post code approach also has advantages, but that the approach of using proxy questions outlined in Chapter 5 may have important benefits:

*I think the benefit of that, when we use the postcode what we are looking at is the impact of the environment, more or less deprived environment, on the individual and a set of factors for us, why when, why when we ask about social economic status we are referring to the individual and to different set of factors, and I think that there is more and more evidence that both are needed and gives us two different kinds of information (PHM)*

In part the need arose from the large social diversity in Lambeth.

*I think what we don't have is an easy way and certainly a systematic way of recognising or recording somebody on an individual basis and the expectation is that will tell us something more useful than what we have looking at someone on a population basis, given the way the diversity even within very small areas, I think there is richness that is missed in existing methods. (GP2)*

However, there were also several concerns raised about the project approach. Some as mentioned below by GP2 raised concerns about the sensitivity of patients being asked questions when registering, and the possibility of stigmatisation. This was also highlighted by some patients (Chapter 6).

*I think clearly there are some people that may find it uncomfortable that there is something in their record that describes them. We have some people that choose not to describe their ethnicity or choose not to engage with data where that particular data will be shared umm there are some people that are uncomfortable about it, I think that's a minority (GP2)*

*I think the risk like with any collection of data putting people in groups is a risk of stigmatisation. (PHM)*

*Mmm a big issue ...and you still hear this stuff which is like, you know, who will declare themselves as being gay, as an example, people don't want to disclose that they have a disability in an organisation and so, it's still an*

*issue, but, you know, many organisations have remedied that by articulating very clearly to people why that, that information is asked of them. (EP)*

The practice nurse articulated the concern that some patients also expressed (see Chapter 6) about not understanding the relevance of being asked such questions. While patients trusted the NHS and their GPs, some would feel suspicious of such questions

*I think people may view that as, as being irrelevant, so they may actually view that as intrusive, even if it's not intended to be so. It's like, I can imagine people taking on the attitude, well, I'm unwell so what's it got to do with how much money I earn or where I live? The fact that I'm unwell as I have to be treated the same as everyone else, it may work conversely, you know, they may see it as something that may work against them, as opposed to something that you're thinking is going to be advantageous to them, sadly. (PN)*

The above comment tended to focus more on issues patients may feel about the process. There were also comments in relation to the ability of the method to produce accurate classification. In particular, two comments made the connection between reconciling the individual based approach with a population based approach.

*Uh...and I think probably it needs to work, well it certainly needs to work at a population level, a bit like other screening programmes...um...so I guess its...may not necessarily be to the direct benefit of that individual but on a population basis the benefit is greater than any harm caused, so I think if you are going to ask a series of*



*question it's on an understanding that they are screening questions where there are going to be false positive and negatives and so forth. (PHC)*

*The second bit is ...um...got to make sure the right things are being commissioned and, and that needs to be based on ...a...population health needs...(EP)*

GP2 made a simpler observation about whether such an approach would be more accurate than a post code approach to classifying patients:

*I think what we have still to demonstrate is that the work involved in doing this gives us information that is better than what we have in using someone's postcode and that is the case and this is worth doing. (GP2)*

Others argued the demographic and cultural complexity of inner city locations make it difficult to devise simple proxies for socio economic position.

*One of the things I have learned in Lambeth is the importance of multiple identities. (EP)*

The equality professional discussed the difficulty of mobility between socioeconomic positions. People may be missed who are part of what was described as in 'working poverty':

*There's a whole group in the middle which is pretty transient, you know, and, and there's...there's a degree of social mobility..... then there is working poverty in a sense. So actually they don't have any benefits, um, they earn a relatively decent income, you know, over 20 -30 k, um, but then, you know, they can't save any money at all but they may have had a university education...(EP)*

The comments made by the refugee health worker highlighted the difficulty in designing proxy questions to classify patients by socio economic positions that are culturally specific. When asked about the approach to identify socioeconomic position of patients when they register, some people saw cultural diversity as an obstacle to such an approach.

*I think its interesting, uh it's, it's, has to be done in a way that is culturally sensitive because you may have someone that has a PhD that is homeless, destitute, suicidal and doesn't know what to do with their life next. Umm, and has survived the war and the entire loss of their families and, and, do not have any friends and is isolated. So in that sense some one who had a business or who was an academic, doesn't necessarily mean they will be in a better position. So we have to look at the factors that influence umm the vulnerability, that generate vulnerability and the ones that prevent vulnerability in a wider context, because what is interesting working with asylum seekers and refugees is that you have the world here, in London, and anywhere you go where there are groups like that but particularly here in London. (RHW)*

There was potentially a deeper and more complex association of low socioeconomic position with stigma and shame than that discussed earlier with regard to income.

*What I will add is something that I have heard from members of staff at the refugee council umm is the fact that the human aspect is associated with shame, they didn't know why a client who has gone through the loops and were actually able to find the system in which they can assisted to fill forms in the language they do not speak can find accommodation find they can actually get together and get things done, why didn't they share this information with others, basically because there's something about cultural issues that we have to address as a shame people find it very difficult to say to others, oh I've been there too.(RHW)*

The issue of cultural difference is widely recognised, often though across regions and nations. The above comments highlight where in such a small densely populated area with high levels of cultural differences using proxies that have been established over a long time with a less heterogeneous population presents new challenges for measuring socio economic position (this is discussed in Chapter 8)

## 7.4 Conclusion

This chapter has explored the views of eight NHS professionals who work in Lambeth, four actively practising clinicians and four professionals who have different

roles in primary care / public health. The findings from the semi structured interviews are therefore specific to these professionals, and generalising these to a wider population of professionals would be inappropriate. However, the issues and concerns that were expressed can be a useful starting point for thinking through the implementation of such an approach, as well as a basis for further research.

There was a clear feeling that working in Lambeth was a positive choice and the interviewees all recognised the healthcare challenges of a diverse population who have multiple needs. A number of comments were made that the fundamental problem was beyond healthcare and related to economic inequality, for example

*The most important factor is inequality. (RTL)*

However, there was a clear commitment to equitable healthcare across all interviewees, and to the view that healthcare can make a difference to health inequalities. When probed, this was usually translated to a view that a vertical equity based approach was needed to address the health inequalities of patients within the borough.

Part of the discussion focused on the importance of seeing patients as individuals, and the need to be able to understand their complex social and economic lives. It was clear that the professionals interviewed believed many patients from lower socio economic backgrounds have limited capability sets to achieve good health states.

There were also a series of obstacles raised in discussion that were not just about resource, for example the structure of the NHS, the willingness and ability of staff to adopt a vertical equity approach, and a lack of political leadership to drive forward the change.

There were real concerns expressed that a target based approach that works on focusing on average needs and average patients leads to a neglect of the patients whose needs are more demanding and resource intensive.

There is then a tension between an understanding and recognition of the need for a vertical equity based approach in order to address the health inequalities that an inner city borough like Lambeth faces, and one that could actually be implemented.

The approach of measuring socio economic position outlined in earlier chapters met with mixed responses. There was acceptance that if individual socio economic position can be measured it would help understand the needs of patients. However, there was also some doubt expressed about how patients might perceive the approach and about the ability of proxies to accurately classify patients in such a culturally diverse population.

The next chapter presents a concluding discussion drawing on the analysis of this and earlier chapters examine the key issues and questions that have arisen in relation to the vertical equity approach outlined in this research.

# Chapter 8 Conclusion

## 8.1 Introduction

The key conceptual concern in this thesis is vertical equity. The thesis has explored arguments and perspectives around adopting a more vertically equitable approach to primary healthcare. It has developed an empirical approach to support its implementation in a particular setting – the inner city borough of Lambeth in London. It is, then, a Lambeth story, but conclusions drawn from this research have applications beyond the borough, in particular, but not exclusively to inner city locations.

This chapter draws analytical and policy-related conclusions from the findings of the research presented in earlier chapters, and looks forward to further potential research. The discussion is structured in line with the title of the thesis *“Identifying individual patients’ socio economic position: a basis for vertical equity approaches in primary health care”*

## 8.2 Defining Equity

Equity itself, it has been argued, is interpreted in different ways in the literature, and by the patients and professionals interviewed for this thesis. However, the definitions and interpretations are usually based in an understanding of what is avoidable and what is inevitable. As shown in Chapter 2 (see Section 2.3), some explanations of the

causes of health differences between individuals are not issues of equity. However in the discussion of Whitehead's criteria, the case was made that equity has a much broader and deeper meaning than Whitehead's, because of the role social and economic factors play in shaping the capabilities of people to achieve good health states. The work of Sen was used to develop the position that a vertically equitable approach to healthcare is needed to address health inequalities (see Chapter 2, Section 2.3). The view of equity adopted in the thesis is one that embeds socio economic factors into the definition of the healthcare needs of patients.

A vertical equity approach to healthcare thus recognises that a range of socio economic factors (e.g. income, status, occupation, education) lead to different health outcomes between individuals. It also recognises that these differences lead to varying healthcare needs for individuals with similar clinical conditions but in different socio economic positions.

Therefore, in order to reduce these differences, and reduce inequities in health, greater healthcare resource needs to be devoted for the same medical conditions to individuals in low socioeconomic positions than to individuals in higher socioeconomic positions. This approach to healthcare can thus be viewed as a counter-weight to the inequities caused by living with the disadvantages of more harmful (to health) socio economic factors.

Further, it has been argued that a vertical equity approach to health care provision can and should be based on identifying the socioeconomic position of the individual. The literature that is drawn upon in discussions of equity and healthcare policy implicitly

or explicitly presents measurement of need as an obstacle to implementing vertical equity-based healthcare policies. This thesis has shown that one aspect of this measurement problem can be addressed, the problem of measuring socio economic position. The thesis thus moves forward the debate on the feasibility of a vertical equity based health care policy. The empirical measurement of socio economic position is complemented by the findings from interviews of a sample of patients and professionals that present related issues on the acceptability of the vertical equity approach.

## **8.2 Targeting a population, and policy implications**

The diversity and density of Lambeth's population (see Chapter 1, Section 1.3) may make post code indicators unreliable in classifying an individual patient's socio economic position, since people with different socio economic characteristics live in close proximity. This thesis has devised an original alternative method to classify patients when they register at a GP practice.

Chapter 4 established a theoretical and empirical rationale for the selection of two benchmark measures of socio economic position, the NSSEC and equivalised household disposable income (see Chapter 4, Section 4.2).

Directly measuring either of the two benchmark measures in this thesis was however problematic. The NSSEC is complex to measure in a routine way at a GP surgery, and in addition, leads to high proportions of missing classifications (see Chapter 4). The information required to measure the income benchmark is too sensitive for many



patients who are likely to refuse to answer, reluctantly answer, or provide inaccurate information.

To address the problems of directly using either benchmark outlined above, a set of proxy questions was devised as indicators. Chapter 4, Section 4.3 explained the necessity for the use of proxy indicators for these socio economic benchmarks, and used cross tabulation and logistic regression to identify five proxy indicators; housing tenure, education level, receipt of income benefit, receipt of any benefit and affordability of heating. These proxies were used as the explanatory variables in logistic models to classify patients by socioeconomic position. Different combinations of the benchmarks formed the dependent variables in the models and were labelled as at risk classifications. The modelling provided a range of choices for professionals who might wish to target patients in low socioeconomic positions.

Chapter 5 established a framework that could be used to classify patients to a socio economic position and enable potential choices for a practical application of an approach to primary healthcare that is based on vertical equity. The proxy indicators were used as explanatory variables to predict the probability of a patient being in a low socio economic position as measured by one or a combination of the two benchmark measures. The estimated probabilities of patients calculated through logit was established and formed the basis of a method to measure the accuracy of the classification by using an original use of sensitivity and specificity measurements.

Chapter 5, Section 5.5 outlined three possibilities for targeting patients classified as being in a low socio economic position:

- a) reducing false negatives
- b) achieving high overall accuracy
- c) targeting within available resource.

Chapter 5 also discussed how the method developed in this thesis could be adapted to focus on different specific medical conditions, where there are known associations between a particular proxy variable and a specific condition. The thesis has thus established an original method that can be potentially operationalised in the setting of primary care. It has also generated a series of questions for further research in this field (see Section 8.3).

The decision on how and who to target is not exclusively a technical problem. It involves a complex set of social relationships, between patients and professionals, patients and other patients, professionals and other professionals, and with other citizens. A policy that aims to target one group of patients over another will need to consider such relationships.

Chapter 6 explored the views of patients through an open question within a structured interview and the findings clearly demonstrated a willingness to engage in a dialogue on how primary healthcare is delivered (see Chapter 6, Section 6.4).

Public participation in healthcare systems has been increasingly discussed in the UK. Comments made by patients showed they sought to be involved in decisions about policies that affect their healthcare. Patients articulated the need to have things

explained to them and have a voice in the way healthcare was organised in a deep and substantial way that could be linked to issues of equity (see Chapter 6, Section 6.4)..

The importance of the individual patient is recognised in the White Paper, *Equity and Excellence: Liberating the NHS* (2010). The paper has among its four key themes a statement that focuses on empowering individual patients and NHS professionals – doctors. It proposes

*“To hand back power to patients and the NHS professionals who treat them: to empower doctors to deliver results – putting them in charge of what services best meet the needs of local people” (DoH 2010)*

The White Paper outlines a series of changes, and while details of the full implementation of the policies are still being formulated, there are some key proposals that are retained in the current version of the Bill. These include PCTs ceasing to exist from 2013, being replaced by GP consortia. The Strategic Health Authorities will also cease to exist from 2012/13 with a new independent National Commissioning Board to be established with overall responsibility for the new GP commissioning consortia. This will allocate and account for NHS resources, lead on quality improvement, and promote patient involvement and choice.

The Conservative / Liberal coalition’s healthcare proposals for patient involvement in shared decision making in healthcare primarily promote individuals’ ability to make choices in areas such as treatment, taking medication and life style changes (Coulter and Collins 2011). This approach was described by Andrew Lansley, the Secretary of State for Health as “no decision about me, without me” (DoH 2010). The aim of

empowering the individual to have more say in her/his own healthcare through providing more choice (e.g. providing information to compare GP practices) is different from patient involvement in decisions about wider issues of overall distributions of resources between patients. It is argued here that such a policy is a shift away from a concern about equity in healthcare.

The wider issues of public participation in healthcare decisions are recognised by Mooney (2010) who, in discussing GP practices as social institutions, argues that the use of resources becomes the business not only of patients, but also of citizens in that community.

Mooney (2010) cites Gilson (2003)

*“Health Systems are not only producers of health and health care, but they are also purveyors of a wider set of societal norms and values”.*

Mooney (2010) suggests the use of citizens’ juries as one possibility for including the wider local community in shaping how healthcare can be delivered.

One of the strengths of the ways in which primary care is organised in the UK is the close relationships that are often developed between patient and GP. In Chapter 6, Section 6.4, patients frequently commented on the strength of their trust in their GP. The current NHS proposals threaten to create more tension in this relationship where a GP has more budgetary responsibilities, with a more explicit connection between the clinical decision and the financial cost of that decision. Patients from both lower and higher socio economic positions expressed concern regarding their care being

determined by the cost of their treatment (see Chapter 6, Section 6.4). Finding a mechanism for patients to maintain their voice in primary care is important when established relationships based on trust and compliance is challenged through the changes outlined above.

Chapter 7 explored the perspectives of some healthcare professionals on different aspects of the vertical equity approach to healthcare outlined in this thesis. It drew on a sample of health professionals working in Lambeth who have a direct interest in the concept of equity in healthcare. The professionals were selected to cover different roles within the healthcare system.

There is a difference between meanings of need as exercised by patient choice (highlighted in the White Paper) and the need as identified by the NHS professionals interviewed for this thesis (see Chapter 7). A key aspect of this difference is whether patients' demands as consumers are the same as professionals' beliefs in what patients need for their health – these are not synonymous.

Discussions of the relationship between patient and doctor are often based around agency (Scott 2000), with the problem of asymmetric information. Patients tended to raise the problem of asymmetric information. This was not in the context of medical knowledge and information, since the comments generally displayed a trust in GPs' capabilities and advice, but more around how information on socio economic background would lead to targeting between patients (see Chapter 6, Section 6.4).

The proposed NHS reforms, by passing budgetary responsibility to the GP, shorten the distance between a patient's individual demands and the person responsible for allocating resource to meet (or not meet) that demand. . The GP treating the individual patient may well be the same person who has made decisions on where resources should be targeted in a more direct way than is the case at the moment. This is likely to further the concerns of patients about targeting unless they are involved in such decisions.

Two of the professionals interviewed in Chapter 7 articulated a concern about a consumer led model:

*I think they umm, the obstacles that are in there over the past decade have been a particular way... of choice in terms of healthcare and that's been to me as a consumerist interpretations, which links more to wants and ability to demand (GP1)*

*I think if one were...um...the providers that do the services are excellent and that's the fairest thing your can offer...um...so that if people want to exercise choice it is not one based on...um...which GP is best...it is...but it is actually what sort of treatments do I want to receive, what sort of medicines do I want to be able to use or, you know, alternative therapies (EP)*

The professionals interviewed generally agreed with a vertical equity approach to health care provision, as outlined in this thesis. They shared a consensus that the

health of the patients in Lambeth is socially and economically determined. They also accepted that in order to address these inequities in health, these socio economic determinants needed to be acknowledged in the way health care was organised.

Some of the possible differences between the Lambeth professionals' views on healthcare and their patients' are important for implementing a vertical equity based approach to healthcare. They highlight the need for patients and professionals to have shared understandings of the meaning of equity in healthcare and the consequences of such an approach.

For example, a key health concern identified by professionals in Lambeth was that of mental health. The Sainsbury Centre for Mental Health (2002) states 90% of people with mental health problems are cared for entirely within primary care. There was agreement by some professionals interviewed that mental health problems are related to social and economic determinants and that in order address these a more vertical equity approach would be needed – that is more resource would need to go to low socio economic groups to manage mental health conditions.

However, patients' views often questioned such social and economic determinants of health and were at times suspicious of a targeted approach to healthcare – with a much more horizontal equity view being adopted (See Chapter 6, Section 6.4)..

### 8.3 Identifying areas for further research

As discussed in the introduction Lambeth is a densely populated borough with high levels of diversity in very small geographical areas.

As both the equality professional and public health manager commented

*“There’s definitely issues when, you know, just one street of Lambeth you have a millionaire....uh...students as well, you know, asylum seekers who are, you know, there’s 20 people living in a 3 bed relatively big house, you know”*  
(PHC)

*“I think at first because Lambeth is a very heterogeneous population”* (PHM)

This diversity is one of the underlying motivations for classifying patients individually rather than by postcode. Demissie et al (2000) and Danielle et al (2005) compared area based measures to individual measures of general population and found significant discrepancies between the two in measurements of socioeconomic status.

Further research based on the findings of this thesis could potentially use a larger sample of patients’ responses to the proxy questions to compare the accuracy of classification of the approach undertaken here with a geo post code approach using a larger sample population in Lambeth.



However, the extreme diversity of Lambeth's inner city migrant population also makes identification of a patient's socio economic position more difficult. This was commented on by professionals who described the multiple identities of patients and the cultural complexity that both benchmarks and proxies may be unable to detect. Chapter 2 discussed how measures of socio economic position are not always sensitive to cultural differences.

This thesis has established a method to classify patients using existing measures of socio economic position based on historical derivations of social class and other social and economic classifications. They were based in a different era that does not reflect the social, economic and cultural composition of Lambeth in 2011. A conclusion can be drawn that further research is needed to explore methods to build in more culturally sensitive measures of socio economic position.

## **8.4 Conclusion**

The group of professionals interviewed who had a direct interest in issues of equity in healthcare recognised vertical equity as a desired approach to healthcare. However, there was little consensus on the likelihood of such a policy being implemented with comments often retreating into a comfort zone of horizontal equity. Horizontal equity is an attractive principle of resource allocation for policy makers, some professionals and patients, as it is an easier concept to define and to some extent to operationalise.

It is hard to judge and unpick the complex set of socio economic factors that determine the clinical condition of a patient. Horizontal equity does not require this effort – if you have diabetes, you have diabetes. The treatment is to a large extent the same whether you are rich or poor. This horizontal equity principle is also consistent with a principle of social justice.

A common problem presented for implementing a vertical equity approach is how to measure socio economic position. In striving to measure socio economic position and the measurement of need linked to it, policies based around vertical equity are argued to be difficult to implement. However Sen (2003) writes of the multi dimensional components of health, and how these should lead to an acceptance of imperfect measurement. As he states:

“it militates against the expectation, which some entertain, that in every comparison of social states there must be a full ranking that places all the alternative states in a simple ordering”

This thesis has addressed this problem at an individual level through a method to classify patients. It accepts that the method does not lead to 100% accuracy in classification, but begins to address the measurement problem that is so often presented as a stumbling block to a vertical equity approach to healthcare.

Other barriers that were cited by professionals in Chapter 7 concerned the structure of the NHS; the fact that different professional work in silos; the need for training,

greater resource and political leadership to drive forward a vertical equity approach.

The Annual Public Health Report for Lambeth (NHS Lambeth 2009) outlines how the focus for policy is not primarily equity based

*“By far the greatest share of health problems is attributable to broad social conditions. Yet, health policies have been dominated by disease-focused solutions that largely ignore the social environment”*

The lack of optimism among professionals, was perhaps due to the timing of the interviews, when roles were uncertain and the future financial climate was seen as harsh. One GP commented:

*and so the way things are structured at the moment we are in a state of mad transition (GP2)*

However, the commitment and will to tackle inequities in health in Lambeth among the professionals interviewed and the engagement and respect of the NHS by patients should also provide optimism that inequities in health can be reduced.

This thesis has established a basis for a different approach to equity in primary care in Lambeth, one that is based on the individual patient, where decisions can be made about targeting patients according to their particular social and economic needs, in order to provide more equitable healthcare.

## **APPENDIX 1:**

### **Structured questionnaire used for interviews**



**4.1.1.1.1 Identifying socio-economically disadvantaged patients in primary care in Lambeth**

**Interviewer: please read the following to the interviewee:**

All answers given to this questionnaire will remain anonymous, that is your identity cannot be established from them and your answers will be confidential. The information will not be used for any other purpose than this project. Your answers do not affect the health care you will receive. If at any time you feel you wish to stop, just say so.

**4.1.1**

**4.1.2**

**4.1.3**

**4.1.4**

**4.1.5**

**4.1.6 Questionnaire**

**4.1.6.1.1 HOUSING**

***Question 1 (CLOSED)***

**What sort of accommodation do you live in?**

**(please tick box)**

**a) Rent from Local Authority (Council) / Housing Association**

☐

b) Rent from a private landlord

☐

c) Own

☐

***Question 2***

**How many rooms are there in your home including kitchen but not  
bathrooms/toilets?**

***Please write in box***

***Question 3***

**Do you find it difficult to meet the costs of heating your home adequately in  
winter (?) (please tick)**

Yes ☐

No ☐

***Question 4 (CLOSED)***

**a) Do you live on your own or with other people in your household who you  
share income and/or costs of living with (e.g. partners, children, parents)?  
(please tick)**

On own ☐

With others ☐

**b) If with others, how many adults including yourself and how many children?**

**Write number in box. (CLOSED)**

Adults

Children (under 5)

Children (between 6-16)

### ***EDUCATION***

#### ***Question 5 (CLOSED)***

**What is the highest level of education you have achieved ? (please tick box)**

a) University or higher

☐

b) In between secondary level and university (e.g. further education)

☐

c) Secondary or high school

☐



d) Primary school or less ☐

e) Other – please specify ☐

## **WORK**

### **Question 6 (CLOSED)**

**How would you best describe your work situation? (Please tick box)**

a) In paid employment ☐

b) Self employed ☐

c) Not worked for less than 6 months ☐

d) Not worked for between 6 months and 12 months ☐

e) Not worked for more than 12 months ☐

f) Student ☐

g) Retired ☐

h) Other – please specify ☐

*If a,b,c,d go to question 7 if employed or was employed Q12 if self employed*

*If e,f,g,h go to question 14*

**5**

## **6 EMPLOYEES**

### **7 Question 7 (OPEN) (for employees only))**

*What does/did the firm or organization you work for mainly make or do (at the place where you work)? Please describe.*

Interviewer: Probe into exact type of industry e.g., manufacturing, distribution, processing, what is
--

**7.1**

**7.2 Question 8 – (OPEN)**

**What was your (main) job?**

Interviewer: Probe for a specific job title role
--

**8 Question 9 (OPEN)**

**9 *What did you mainly do in your job?***

**Interviewer:** Check to see if there were any specific qualifications required for this role eg professional or vocational.

**Question 10 (CLOSED)**

In your job, did you have any formal responsibility for supervising the work of other employees? (please tick)

Yes ☐ No ☐

**Interviewer: DO NOT INCLUDE:**

- supervisors of children, e.g. teachers, nannies, child minders;
- supervisors of animals;
- people who supervise security or buildings only, e.g. caretakers, security guards

**Question 11 –(CLOSED)**

**How many people worked for your employer at the place where you worked?**

Interviewer: Read down each in turn until selected

- a) 1 to 24 ☐
- b) 25 to 499 ☐
- c) 500 or more employees ☐

Interviewer: We are interested in the size of the local unit of the establishment at which the respondent works in terms of total number of employees. The 'local unit' is considered to be the geographical location where the job is mainly carried out. Normally this will consist of a single building, part of a building, or at the largest a self-contained group of buildings. It is the total number of employees at the respondent's workplace that we are interested in, not just the number employed within the particular section or

Interviewer: Employees now move to question 14

### **9.1.1.1**

### **9.1.1.2 SELF EMPLOYED**

Interviewer: Ask this if answered Q6 b, or was self employed before Q6 c, d above?
--

**Question 12 – (CLOSED)**

**9.1.1.3 Were you working on your own or did you have employees?**

**(please tick box)**

On own/with partner(s)

☐

With employees

☐

With employees (go to question 13)

**10**

**11 Question 13 (CLOSED)**

**How many people did you employ at the place where you worked?**

**Interviewer: Go down each in turn until selected**

**a) 1 to 24**

☐

**b) 25 to 499**

☐

**c) 500 or more employees**

☐

**Interviewer: All interviewees should now answer the remaining questions**

## **INCOME**

### **Question 14 (CLOSED)**

**Interviewer: Probe for household, not individual, income**

**Do you get paid weekly or monthly ? If weekly answer i) and if monthly answer ii)**

**i) What is the income that comes in to your household per week after tax and other deductions? (please tick box)**

- a) Less than or equal to £100 per week ☐
- b) From £101 to £200 ☐
- c) From £201 to £300 per week ☐
- d) From £301 to £400 per week ☐



e) £401 per week or more

☐

**ii) What is the income that comes in to your household per month after tax and other deductions ? (please tick)**

a) Less than or equal to £400 per month

☐

b) From £401 to £800 per month

☐

c) From £801 to £1200 per month

☐

e) From £1201 to £1600 per month

☐

e) £1601 or more per month

☐

### ***BENEFITS***

#### **Question 15 (CLOSED)**

**Are you in receipt of any benefits? (Please tick)**

**Yes**

☐

**No**

☐

**If yes which of the following?**

**Question 16**

**(tick any that apply)**

a) Job seekers ☐

b) Income Support ☐

c) Disability Benefit ☐

**12**

**13 PERSONAL CHARACTERISTICS**

**14 Question 17 (CLOSED)**

a) Are you male or female?    please tick            male ☐            female ☐

**Question 18**

a) What is your age?

**Question 19**

**a) What is your main spoken language?**

Albanian	<input type="checkbox"/>	Arabic	<input type="checkbox"/>
Bengali	<input type="checkbox"/>		
Cantonese	<input type="checkbox"/>	English	<input type="checkbox"/>
French	<input type="checkbox"/>		
Ga	<input type="checkbox"/>	Greek	<input type="checkbox"/>
Gujarati	<input type="checkbox"/>		
Igbo	<input type="checkbox"/>	Italian	<input type="checkbox"/>
Punjabi	<input type="checkbox"/>		
Portuguese	<input type="checkbox"/>	Somali	<input type="checkbox"/>
Spanish	<input type="checkbox"/>		
Tigrinian	<input type="checkbox"/>	Turkish	<input type="checkbox"/>
Twi	<input type="checkbox"/>		
Urdu	<input type="checkbox"/>	Vietnamese	<input type="checkbox"/>
Yoruba	<input type="checkbox"/>		
Mandarin	<input type="checkbox"/>		

Other- please specify ☐

Do you need an Interpreter/Translator

Yes ☐

No ☐

b) **What language do you prefer to read?**

Albanian	<input type="checkbox"/>	Arabic	<input type="checkbox"/>
Bengali	<input type="checkbox"/>		
Cantonese	<input type="checkbox"/>	English	<input type="checkbox"/>
French	<input type="checkbox"/>		
Ga	<input type="checkbox"/>	Greek	<input type="checkbox"/>
Gujarati	<input type="checkbox"/>		
Igbo	<input type="checkbox"/>	Italian	<input type="checkbox"/>
Punjabi	<input type="checkbox"/>		
Portuguese	<input type="checkbox"/>	Somali	<input type="checkbox"/>
Spanish	<input type="checkbox"/>		
Tigrinian	<input type="checkbox"/>	Turkish	<input type="checkbox"/>
Twi	<input type="checkbox"/>		
Urdu	<input type="checkbox"/>	Vietnamese	<input type="checkbox"/>
Yoruba	<input type="checkbox"/>		
Mandarin	<input type="checkbox"/>		
Other, please specify:	<input type="checkbox"/>		

c) How would you describe your religion? Please select two boxes if you wish.

Baháí	<input type="checkbox"/>	Buddhism	<input type="checkbox"/>
Christianity	<input type="checkbox"/>		
Hinduism	<input type="checkbox"/>	Islam	<input type="checkbox"/>
Jainism	<input type="checkbox"/>		
Judaism	<input type="checkbox"/>	Sikhism	<input type="checkbox"/>
Zoroastrianism	<input type="checkbox"/>		
Church of England	<input type="checkbox"/>	Free Church	<input type="checkbox"/>
Orthodox	<input type="checkbox"/>		
Roman Catholic	<input type="checkbox"/>	Jehovah's Witness	<input type="checkbox"/>
None - comments	<input type="checkbox"/>	_____	
Other Christian – please specify		_____	
Any other Religion -please specify		_____	

d) What do you consider your Ethnic Group to be?

*Asian or British Asian*

Indian/British Indian	<input type="checkbox"/>	Pakistani/British Pakistani	<input type="checkbox"/>
Mixed Asian	<input type="checkbox"/>		
Bangladeshi/British Bangladeshi	<input type="checkbox"/>	Caribbean Asian	<input type="checkbox"/>
British Asian	<input type="checkbox"/>		
Sinhalese	<input type="checkbox"/>	Sri Lankan	<input type="checkbox"/>
Tamil	<input type="checkbox"/>		
East African Asian	<input type="checkbox"/>	Other Asian unspecified	<input type="checkbox"/>
 <i>Black or Black British</i>			
Caribbean	<input type="checkbox"/>	African	<input type="checkbox"/>
Black British	<input type="checkbox"/>		
Algerian	<input type="checkbox"/>	Angolan	<input type="checkbox"/>
Eritrean	<input type="checkbox"/>		
Ethiopian	<input type="checkbox"/>	Ghanaian	<input type="checkbox"/>
Nigerian	<input type="checkbox"/>		
Somali	<input type="checkbox"/>	Sudanese	<input type="checkbox"/>
Ugandan	<input type="checkbox"/>		
Mixed Black	<input type="checkbox"/>	Other Black unspecified	<input type="checkbox"/>

*White*

British	<input type="checkbox"/>	Bosnian	<input type="checkbox"/>
Other white/mixed European	<input type="checkbox"/>		
Irish	<input type="checkbox"/>	Kosovan	<input type="checkbox"/>
Other			
white unspecified	<input type="checkbox"/>		
English	<input type="checkbox"/>	Albanian	<input type="checkbox"/>
Greek	<input type="checkbox"/>		
Scottish	<input type="checkbox"/>	Serbian	<input type="checkbox"/>
Gypsy/Romany	<input type="checkbox"/>		
Welsh	<input type="checkbox"/>	Croatian	<input type="checkbox"/>
Greek Cypriot	<input type="checkbox"/>		
Portuguese	<input type="checkbox"/>	Turkish	<input type="checkbox"/>
	<input type="checkbox"/>		Kurdish
Cypriot	<input type="checkbox"/>	Spanish	<input type="checkbox"/>
Turkish Cypriot	<input type="checkbox"/>		
Other former Yugoslavia	<input type="checkbox"/>	French Italian	<input type="checkbox"/>
former USSR	<input type="checkbox"/>		All

*Mixed Background.*

White & Black Caribbean	<input type="checkbox"/>	White & Black African	<input type="checkbox"/>
White & Asian	<input type="checkbox"/>		
Black & Asian	<input type="checkbox"/>	Black & Chinese	<input type="checkbox"/>
Black & White	<input type="checkbox"/>		
Chinese & White	<input type="checkbox"/>	Asian & Chinese	<input type="checkbox"/>
Other mixed unspecified	<input type="checkbox"/>		

*Other Ethnic Groups.*

Chinese	<input type="checkbox"/>	Japanese	<input type="checkbox"/>
Vietnamese	<input type="checkbox"/>		
Filipino	<input type="checkbox"/>	Malaysian	<input type="checkbox"/>
Arab	<input type="checkbox"/>		
Iranian	<input type="checkbox"/>	Iraqi	<input type="checkbox"/>
Middle Eastern	<input type="checkbox"/>		
Colombian	<input type="checkbox"/>	Other Latin American	<input type="checkbox"/>
Ecuadorian	<input type="checkbox"/>		

*Traveller*



Traveller ☐

Irish Traveller ☐

Any other group – please specify ☐

Not stated ☐

Interviewer: Finally I just want to get your thoughts about the questions.

Go back to different categories of questions and for each ask the interviewees the following and tick appropriate box

***Question 20***

Q1 Housing      Acceptable to ask ☐    Unacceptable ☐    Unsure ☐

Easy to understand ☐    Difficult to understand ☐

Q4 Household      Acceptable to ask ☐    Unacceptable ☐    Unsure ☐

Easy to understand ☐    Difficult to understand ☐

Q5 Education      Acceptable to ask ☐    Unacceptable ☐    Unsure ☐

Easy to understand ☐    Difficult to understand ☐

Q6-Q13 Work      Acceptable to ask ☐    Unacceptable ☐    Unsure ☐

Easy to understand ☐ Difficult to understand ☐

Q14 Income      Acceptable to ask ☐    Unacceptable ☐    Unsure ☐

Easy to understand ☐    Difficult to understand ☐

Q15 Benefits      Acceptable to ask ☐    Unacceptable ☐    Unsure ☐

Easy to understand ☐    Difficult to understand ☐

***Overall would you find it acceptable to be asked these sort of questions when  
registering as a patient at the Practice***

Acceptable to ask ☐    Unacceptable ☐    Unsure ☐

***Any comments particularly about your feelings about the questions***

Interviewer: Thank patient for their time and remind them they can contact name on consent form if they wish

## **Appendix 2**

### **Prompt Questions for semi structured interview with practitioners**

**1What are the most important factors that affect the health of patients in Lambeth ?**

**2What do you think is a fair or equitable health care system ?**

**3In your own role are there any particular obstacles to improve equity ?**

**4Should patients socio economic position affect the health care they receive ?**

**5Would it be acceptable to devote more resources to lower socio economic groups ?**

**6) One approach is to identify a patients socio economic position when they register at a GP practice through asking a series of questions on proxy indicators of socio economic position. What are your views on this ?**

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